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By

The Agricultural Club

Of the

University of Georgia

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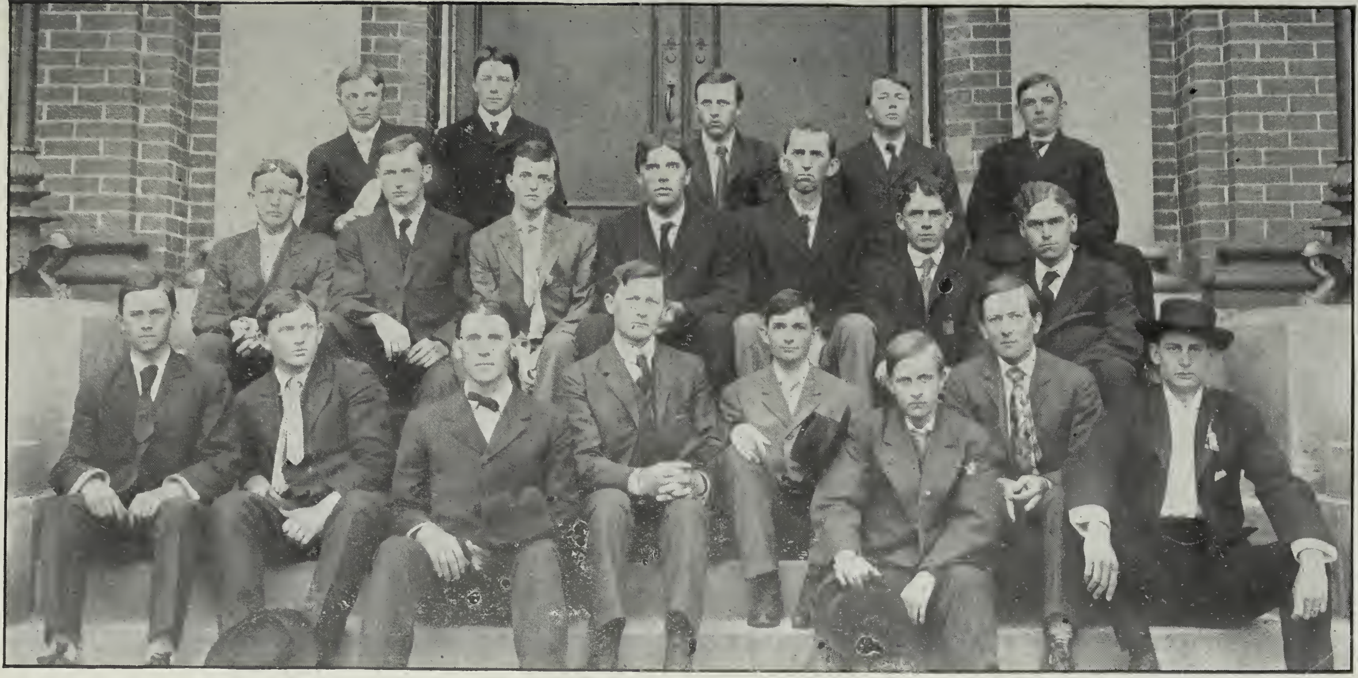

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A. H. Trotier

The Agricultural Annual

By the Agricultural Club of the University of Georgia

JULY, 1907.

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Announcement

The Agricultural Society of the University presents the Annual this year in order to keep abreast with the times and to show what we are doing in the way of agriculture in the University. The magazine is published for the benefit and interest of the farmer. We respectfully dedicate it to the farmers of Georgia and we trust that it will at least serve to show the interest that the University is taking in this most important profession—farming.

It will always take men of judgment and experience to farm. We never hope or wish to lay down any iron clad rules for the farmer or reduce the profession strictly to a science; but there are certain fundamental principles that every farmer should know. We are making great progress in this general information. The day of the educated farmer is now on us. We welcome him and expect great things from him.

We have begun to teach and study our life work. Already primary agriculture is being taught in every school in the state. We shall soon be ready to follow it up in our agricultural high schools and colleges more systematically, attractively and profitably. When law was in its infancy the criminal was forced to do without water for a day or two and then put in water up to his chin but not allowed to drink. Today agriculture is in its infancy and every root of the plant is embedded in a potash bearing soil and the branches of the plant are surrounded with the air which is four-fifths nitrogen and yet the plant starves for potash and nitrogen compounds. The great question for the farmer is a remedy for this evil. There is enough nitrogen in an acre to make forty bushels of corn or wheat or a bale of cotton to the acre for many many years, but before the plant can use it the physical status of the soil must be in good condition. We must stir the ground, supply humus, drain the water if too much, and supply it if not enough to get the best results.

There are many fields open to our boys, but few, if any, promise the peace, the air, the water, the health, the muscle, and the pay of the farm.

The farmer, like all other classes, must meet dame nature face to face, keep up with her changes, and reap what she sows. He is now mixing his own fertilizer, plowing with a two horse plow instead of the one horse plow. The harrow is taking the place of the scooter and scrape, skilled labor is taking the place of unskilled. Deep plowing is done in the fall when the ground is dry. Underground drainage is carried on in South Georgia and irrigation in North Georgia. He is learning how to make the most on the least area in the shortest time. He is learning to use, keep, or sell his crop to the best advantage. No longer is it as Grady once so aptly expressed it when he said: "I attended a funeral of a poor man in Pickens County, Georgia. They buried him in the middle of a marble quarry. They cut through solid marble to make his grave and yet the little tombstone they put above him was from Vermont. They buried him in the heart of a pine forest and yet the pine coffin in which he lay was imported from Wisconsin. They buried him within touch of an iron mine, and yet the nails in his coffin and the shovel that dug his grave were imported from Pittsburg. They buried him by the side of the best sheep-growing country in the world and yet the wool in the coffin bands themselves were brought from the north."

The South did not furnish a thing on earth for that funeral but the corpse and the hole in the ground. They put him away there and the clods rattled down on his coffin and they buried him in a New York coat and a Boston pair of shoes and a pair of breeches from Chicago and a shirt from Cincinnati, leaving him nothing to carry into the great beyond with which to remind him of the country in which he lived and for which he fought for four long years but the chill of blood in his veins and the marrow in his bones."

The State was very liberal last year in its donation to her educational institutions. Our advantages for a higher education will leave the ignorant without an excuse. The boy that uses these opportunities and properly educates himself will be happy, healthy and his barns will be filled with plenty.

D. S. STARR.

Farm Improvement and Economy

I shall deal with the subject of farm improvement under three general heads: (1) The treatment of the soil; (2) The matter of indebtedness; and (3) The improvement of the farm. My observations are made from the average farm of Georgia but the same principles apply to farming in general.

The ordinary Georgia farmer has very limited means for improving the fertility of his soil, so he must follow economical methods. To him the only ways of making the soil more productive are tillage, manure, and the rotation of crops.

By tillage is meant all plowing, harrowing, etc., that will be necessary in the production of the crop.

Plowing is an art. A master of this art is one that knows just how and when to plow in order to make the land produce the largest yield. Deep plowing in the fall makes the land more productive. It puts the soil in condition to hold a larger amount of water. This keeps the soil from "washing away" during the winter rains, and enables the soil to hold its moisture for the dry summer season. Land may be made to hold enough water to produce a good crop if the surface is kept in good condition by frequent cultivation. A very striking example of the effect of thorough plowing is shown in California. There the land is covered with large fruit trees which bear heavy loads of the very finest fruit, and yet they seldom have rain from April till October. This wonderful success is secured by putting the soil in the best condition for absorbing water during the rainy season, and then keeping the surface stirred to hold the moisture. If the soil is plowed to a depth of eight or ten inches there is no danger of the soil washing into gullies.

The analysis of the soil shows that it contains a store of plant food sufficient to produce heavy crops for a century or more without any additional application of fertilizers. The farmer is dependent upon this store of plant food for producing his living. But this plant food is in an unavailable form for the use of the plants. Therefore it is impossible to waste this store of wealth in two or three generations, but it is made available only by the proper use of the plow. So the farmer must plow deep if he would get a large amount of this plant food where the plant can use it. Again all plant food in the dry state is dead to the growing plant, so the farmer should keep his soil plowed thoroughly that it may hold water for dissolving the plant food, and that the crop may not be checked in its growth in the dry season of summer.

Another important result from good plowing is that it allows the air to ciruclate to great depths with ease. This is one of the benefits derived from frequent shallow plowing around the growing crop. The soil may contain plenty of available plant food and moisture, but if the surface is not stirred often the crop will not make the maximum growth. In the early spring this helps the sun to warm the ground and to induce an early growth which is so desirable.

The next way to make the soil more productive is to apply the plant food directly to the soil in the form of commercial fertilizers, barnyard manures, and decaying vegetable matter. This is the quickest method and the one most used to make the soil produce a paying crop. This matter of fertilizing, which is comparatively new, is necessary for growing a profitable crop, and should be understood by all farmers.

But in many cases it is possible to diminish the amount of fertilizers bought by using all the farm manures, though in some cases the farmer must buy at least a part of his fertilizers. He should not buy the merchant's ready mixed goods, and that on credit without a knowledge of the value this stuff will be to his crop. In the first place he should borrow the money to pay for it if he has not got it. In the second place he should be well informed as to how to mix his fertilizers, and he will be if he carefully reads his farm papers. He can mix a ton of fertilizer with a cost of not more than 50 cents, and yet the manufacturer charges $4 to $5 for mixing each ton. And this saving means much to the farmers. Very often the farmer carelessly allows the farm manures to waste during all the winter, and then buys and hauls all his fertilizers from the market. He should save with the utmost care both the liquid and the solid excrement of all his animals. This manure will do more to permanently improve his soil than the best of fertilizers he can buy. If he will keep more cattle and save all the manure the fertility of his soil will increase very rapidly.

By experiment it has been shown that the excrement of farm animals contains plant food worth nearly half that of feeding the animals. To illustrate, if all the manure is carefully saved from a cow it has a commercial value of almost half the value of the food the cow eats. Also it is shown that the manure contains more nitrogen when the cow is fed on nitrogenous food, and by feeding these nitrogenous foods the farmer can produce nitrogen for his soil at 10 cents per pound when he has to pay the merchant 15 or 18 cents per pound for it.

It has just been shown that more profit has been derived from feeding these nitrogenous plants, but it may be said also that more profit is derived from growing these plants containing much nitrogen than any other. Legumes (peas, clovers, vetches etc.) use much nitrogen but they have the ability to get their supply from the atmosphere and also to store some up in the soil. Heretofore the process of inocculating the land for these leguminous plants has been very expensive. It was necessary to take up a part of the soil from near the roots of the plant, and scatter this over the field to be inocculated. This was expensive anl often caused trouble by spreading plant diseases. But since Mr. G. F. Moore has made his discovery along this line, the soil may be inocculated without any expense, and perfectly safe from spreading disease germs. Inocculation by this more successful method has been made to produce bettter results than any application of 122 pounds of nitrogen per acre will produce. This nitrogen has a commercial value of $20 per 122 pounds. The plant is not only enabled to save 122 pounds for present use but also enabled to store up almost as much in the soil that may be used by the next crop that is grown on the land. So it seems that the farmer should produce all the nitrogen that he needs for the soil and make money at the same time from the crop grown.

Many soils do not make good returns when large amounts of available plant food are present, in this case the soil probably needs lime. Most any farmer can determine this. He may use the litmus test or he may apply a small amount and see if the crop is improved thereby. Either of these will do but the actual trial is more reliable.

Diversified farming is gaining ascendency very fast and the farmer must keep up with the age if he would compete with those that use the best methods. Every farmer should adapt a good plan of rotation that suits his soil whether it be a two, three, or four year rotation that he needs. The old idea that the soil contains more fertility than the present generation can use is misleading yet true in fact. Though the soil contains boundless stores of plant food, experiment has shown that this plant food is made available very slowly, and that the available part escapes when any waste is allowed. By proper management no waste is allowed. By proper rotation no fertility is wasted. What one crop does not readily respond to produces the best results with another. Again no crop can make a proper yield and use up all the plant food that is in the very best state for its use. This surplus plant food will soon be dissolved and carried away by the air unless a cover crop is planted to hold it.

Even the soil-renovating cowpea will not be nearly so profitable without rotation. The greatest profit is derived from its power to store nitrogen in the soil, but this power is lost when peas are grown on the same land for many successive years. But if peas are followed by cotton, corn, or small grain a very great profit is derived, especially if the soil was poor in nitrogen. It is not enough for the farmer to study how to fertilize his crops but he should study the character of the soil suited to each particular crop. It is not economy for the farmer to grow legumes on soil rich in nitrogen, especially if he has any soil that is poor in nitrogen.

Another advantage gained by this system of changing crops each year from one field to another is the ability to stop insect pests and to check plant diseases from spreading so widely. Each crop has its peculiar insect pests and diseases, and if grown on the same soil for many successive years these make the crop unprofitable in many cases. But if constant change is made they cannot get such a stronghold. To illustrate, say we have a cotton field that was worked by Boll Weevil to a small extent this year. Next year there will be a great army of these insects in this field, but if this field is planted in corn next year these cotton enemies will die of starvation for they do not feed on corn. This is true of many other pests with which the farmer has to deal.

Again weeds become troublesome at times when the same crop is grown on one piece of ground for a long period of time. A meadow or pasture may become absolutely worthless as such even when the soil is rich just because some troublesome weeds have smothered out the grass. In such a case a crop requiring clean culture is desirable.

Next in order is the problem of producing a crop without the "usual indebtedness." I take the term usual indebtedness to refer to the lien system, which seems to be followed by a great many farmers. By this system, the farmer goes to the merchant in the spring to get him to "run" the farmer for the year. If the farmer will plant a big crop of cotton he can usually get run. So the merchant sells him on credit supplies of all kinds up to a certain amount. This amount is limited by the crop of cotton the merchant thinks the farmer will produce. So one of the greatest evils of this system is that it forces the farmer to plant everything in cotton, therefore he cannot raise his bread and meat for the next year. Once in this system, he is powerless to get out. The greatest direct loss to the farmer from this system is that he pays from 25 per cent. to 50 per cent. more than he should for the supplies he gets.

The best thing for him to do if he must go in debt is to borrow the money from the bank or his more fortunate brother farmer. Then he does not have to pay such an enormous percent on his money and he can pay it soon or late as it suits his convenience. So he is not forced to sell his cotton when the price is lowest. Again money-lenders do not usually take securities on a crop, so he may plant any crop that suits him for raising his supplies.

But you say he cannot borrow the money which is very often the case. Then he should either make a crop without the supplies or pay up as he goes. In many cases he can very well make out without part of the supplies. In fact many times he does not get what he needs most to make the crop.

The best plan for the farmer is to keep out of debt, but it is easier to tell what he should do than it is to do it. In the first place he should adopt an intensive system of cultivation. The average farmer should reduce his acreage 20 per cent to 40 per cent. This would reduce the cost of production in almost the same ratio and allow him to tend a small crop well. It costs just about as much to produce a sorry crop as it does to produce a good one, in some cases more. Two neighboring farmers may produce the same amount of cotton, and one may be making money and the other may be losing his home. The one produced ten bales of cotton on as many acres, and the other produced the same number of bales on forty acres. The former used one mule and the latter two. You readily see that one did a profitable business and the other lost money.

Where a man is not over-cropped he may do many fancy things that pay so well. Certainly he should have a few colonies of bees, and if he will give them a little study and attention they will pay him well. He can tend to them without losing any time from his crop, if he has made a little preparation during the winter. A strong colony of bees has been made to produce $6 worth of honey in one season, when the farmer took a little pains to produce the very desirable combed honey. Some one may say he would do better to give all his attention to bee-keeping, but this, like many other pursuits, becomes unprofitable when carried too far. A dozen colonies will be profitable where two dozen will scarcely make a living. He may make money from poultry if he will manage to get his product on the market when prices are high. There is always a demand for early fries, and eggs are profitable in December and January. The farmer should produce a surplus of nice vegetables and milk and butter even though he does not go into market gardening and the dairy business. The money from these products comes in all along through the year, so it is much easier to keep out of debt.

Indeed, I would not advise the Southern farmer to quit raising cotton altogether, but he should raise less cotton and more food products. It is not enough for him to raise all the food stuffs that he can consume on the farm, but he should sell enough of these products to pay all expenses of running the farm. Then what cotton he raises he can keep till he can get the worth of it.

The Northern farmer makes more profit from his stock farm than the Southern farmer does from cotton. The Southern farmer has an advantage over the Northern farmer in stock raising but he has studied nothing but cotton, and does not try to produce much else for the market. There is an article in "Country Life in America" for May, 1905, devoted to a Northern sheep farm. The main product sold was early winter lambs. It cost some money and trouble to produce these hot-house lambs, but the extra expense was far below the extra profit derived from them. These lambs were worth $15 each and the summer lamb is only worth $5. These early lambs can be produced in Georgia with much less expense than they were in New York. But the Southern farmer does not produce enough summer lambs. Even this pays better than cotton.

Another industry the Southern farmer should give more attention to is the production of fruits for the Northern market. Some farmers have gone into the peach business, but only a very small percent of these peach growers understand their business.

The matter of carefully saving all farm products is of great importance in the improvement of the farm. Many farmers waste a good profit on their crops, not only in the quantity but more especially in the quality of the produce. Truly the main thing to know is not how much can be produced but how much can be saved. The farmer should prepare in time to save all crops at the proper stage of growth. He had better not have produced a crop than to let it waste after he has produced it.

Another matter upon which the farmer is shamefully negligent is the care of his tools and implements. Many implements that were bought on credit are almost worthless before they are paid for, simply from lying in the weather. Implements that lie out in the weather all winter do poor work. Even if it did not make them last longer it is necessary to shelter them in order that they may do better work while in use. At least half the value of the implement is lost by lying in the weather when not in use.

The income of the farmer depends more on his education and early training than any other one thing. The old maxim, "There is more in the man than in the land" is true if the man is educated. But so many farmers have not had the proper training that it is necessary to deal with the comparatively uneducated farmer. But the average farmer has enough education to read with intelligence any agricultural paper and to follow directions given therein. So the uneducated farmer may follow good methods by studying the experience of others. But if he is so narrow as to be prejudiced against all knowledge found in a book his case in indeed pitiable. The time for such ideas to prevail are gone now. The farmer may get along some how without any education, but he is very unwise if he reasons from this that his son can do as well as he did without education. When it was the majority that were ignorant, ignorance did not keep a man down below the rest in his life struggle but now since competition has increased so much, ignorance will be surpassed and crowded out. So the farmer should not be satisfied with giving his children the same advantage of an education that he had, for they will not have the same conditions in which to live. He should not grudingly give these educational advantages for it will be a force that will increase the profit from the farm in his time and of inestimable value after the son has taken the head of the plantation.

WM. W. LANG.

Farm Manure

This is a subject of great importance to every farmer, though it is recognized as such by only a few of them.

The time was when any substance put upon the land for the purpose of enriching it was called manure. But the meaning of the word has changed somewhat, and no longer includes commercial fertilizers.

The term manure, is now applied to the excrements of animals, mixed or unmixed vegetable matter. In rare cases however, fertilizers are mixed with them in quantities sufficient to change the character of their constituents.

There are two kinds of farm manures, viz.: stable manure, and farm yard manure. The former has reference to those manures that are sheltered and cared for until they are taken to the field, and the latter has reference to those that are left unnoticed, as though they were valueless, in the farm yard exposed to the action of the rain and sun.

Manures vary greatly in their chemical composition, and also in their effect upon the soil and crops. These variations are due to many causes, ten of which I shall discuss briefly.

First, the age of the animal making the manure.

Young animals digest their food more closely than old ones do. Then, too, the young, growing animal needs all of the constituents of its food for growth and development. The young animal has to build up bone, flesh and muscle, and will gain more pounds of these to the amount of food consumed than the older animal, but the resulting excrements will be much less valuable.

On the other hand the older animal is mature and only requires enough food for the sustenance of life, which is a very small amount. Therefore, if it be fed large quantities of food the resulting excrements will contain nearly all of the manurial elements found in the food before eaten.

Second, the species or kind of animal that makes the manure.

All animals do not make manure of equal value. Two horses of exactly the same age, with the same amount of food may make an entirely different quality of manure. This would depend, however, on the condition of the animal and its digestive organs. Now if this be true, then animals of different species would of course vary according to the digestive powers of each to assimilate food.

Third, the use to which the animal is put.

It of necessity takes more food for a working animal than it does for one that is standing idle, for the former digests its food more closely. Those that are rearing or reproducing young make poorer excrements than the same animal would if it were not bearing young. According to Prof. I. P. Roberts, of Cornell University, "mature animals, which are non-productive and are not increasing in weight, return sooner or later nearly all of the manurial constituents of their food in their excrements, while only one-half or two-thirds is returned by young and rapidly growing ones. Cows in full milk return in their excrements only about 65 to 75 per cent, while fattening animals return 85 to 90 per cent of the fertilizing elements

Fourth, the quantity of food consumed.

It takes a certain amount of food to keep an animal up and no more, therefore, if an animal be fed a large amount of food there will of course be a large amount of excrements. But if the animal be fed only a small amount of food it will have to be digested more closely, and the small amount of excrements will be poor in manurial constituents.

Fifth, the quality of food consumed.

If an animal be fed on, or receives, food that contains a high percentage of manurial constituents, the resulting excrements will be rich in plant food elements. For instance, if a cow be fed ten pounds of good hay per day the resulting excrements will be rich in plant food elements. But if the same animal be fed eight pounds of cotton seed hulls, two pounds of cotton seed meal, and ten pounds of poor hay the resulting excrements will be poor in plant food elements.

Sixth, the quantity of water consumed.

Dr. H. C. White, the professor of Chemistry in the University of Georgia, stated to his class, of which I was a member that "stable manure only contains about five pounds of nitrogen to the hundred and nearly all of this came directly from the urine." Now it can be readily seen how the quantity of water consumed can greatly affect the quality of the manure.

Seventh, quantity and quality of bedding used.

If the bedding is poorer than the excrements, as is nearly always the case, the more bedding used the lower will be the percentage of manurial value. Although a certain amount of bedding is advisable, as it not only adds to the comfort of the animal but it acts as an absorbent of the liquid manure, a great portion of which will be lost if straw or litter of some kind is not used.

The quality of bedding used greatly affects the manure. Pine straw is believed to be injurious to all manures, while oat or rye straw in limited amounts have proved themselves beneficial. Oak or any hard wood leaves may be good but they do not contain large quantities of potash as some people believe.

Eighth, preservatives used.

The proper place for manure is in a stable or shed where it can be protected from the rain and sun, both of which very rapidly decrease in value manures of all kinds.

Some people are led to believe that lime should be added to the manure pile or compost heap. There are several advertisements in papers of different kinds that advertise formulas of, "How to make the manure heap pay," all of which in some way advocate the use of lime. But let me say right here that every ounce of manure to which lime is added is greatly decreased in value as it liberates nitrogen, the most important element of the manure. Lime may be used advantageously on the trash pile and all coarse material as corn stalks and the like to make them decompose more rapidly. But the farmer, if he be up-to-date, will never put lime in the compost heap."

Ninth, fermentations, or rotting.

It is hardly worth the while to dwell upon this item for all intelligent farmers know that manure should be well fermented or rotted before it is applied to the land. There are certain chemical changes that have to take place in manure before it is available as plant food, and if it does not go through these stages in the stable or heap it has to go through with them after they are applied to the soil. This fermentation, however, should not be allowed to take place too rapidly as the liberation of nitrogen is greatly increased.

Tenth, leaching and weathering.

This is last, but by no means least. It should be the height of ambition in every farmer to preserve and prevent the leaching of the manure accumulated on his place. An ounce of plant food from manure is worth just as much as an ounce in a commercial fertilizer, and the principal element of manure (nitrogen) is most easily washed out and is the most expensive one on the market. How can any man profit by throwing away the plant food elements of the manure pile and buy them from a fertilizer dealer and haul them probably ten miles? Besides the benefit derived from stable manure as a source of available plant food for the crop growing upon the land to which it has been applied, it is a land builder. Now the farmer of course can receive beneficial results from commercial fertilizers as a source of available plant food, but it is utterly out of the question when it comes to building up land with them. Yet, the farmer will sit contented and see the very essence of his toil and labor so to speak, float off by the dollar's worth annually to the ocean.

The lot should be in the highest and dryest place about the farm yard. How many lots have you seen that all of the water from the yard and some from the road ran through them? I dare say you have seen but few that were not thus located.

The manure of the farm is one of the surest and best ways for the farmer to practice economy. Every stable and barn yard where two or more head of stock are kept is a source of profit that the farmer must deal with if he expects to succeed in this day of expensive labor and keen competition.

L. E. RAST.

The Need for Trained Men In Agriculture

The South has been dependant upon the farmer and his products ever since the war between the states, and is destined to remain so. This is particularly true of Georgia, and if she expects to maintain her position as the leading state of the South, Georgia must protect and develop the resources of the farmers. The movement for greater achievements in agriculture has already been started in the state. The legislature has made the necessary appropriation for establishing a system of agricultural schools. Since eighty per cent. of our people live on the farm, it is very necessary that the state provide training that will fit our people for this life. The districct schools and the college of agriculture recently provided for must form the basis of further development of agriculture in Georgia. Not until our farmers are educated will our farms make as large returns as they should.

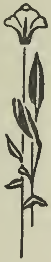
The funds appropriated by the state form a very important part in establishing these schools, but the successful operation of them will require something more than a liberal support from the state treasury. They must also be supplied with competent men if they render the service that was intended they should. The men that operate these schools must be educated for this special work. If these men have a knowledge of modern languages, it is well; but they must have a knowledge of some of the sciences too and especially of those sciences that are related to agriculture. The classical education certainly will not make men unfit for this work, but this kind of work in itself will do very little toward fitting men for teaching agriculture.

Besides the demand for men versed in scientific agriculture to teach in these schools there is a constantly increasing demand for these men to do experimental work. The appropriation for the support of the state experiment stations was doubled about a year ago by congress. This has created a demand for several more men to be secured for our station at Griffin. The Department of Agriculture at Washington is constantly enlarging and reaching out into new lines of work. These men are secured from different states and territories; and Georgia is expected to furnish her share of them.

All these places to be filled have created a demand for men, and this demand is not simply for an immediate supply, but for an ever increasing number. So the question is, what are the prospects for securing these men in Georgia? Are our young men preparing themselves for doing this work? The University should send out a large number of these men, as is naturally expected of her. It is hoped to greatly increase the facilities for study in agriculture when the new college in agriculture is established, but the present school in agriculture would accommodate a much larger number than are now taking this course. It is true that a four-year course in this school will not fully prepare a man for these places, but this is the best school of its kind in the South, and this work must be done first even if a more detailed study is pursued later. But there are not enough men ready to do the post-graduate work to fill these places now vacant.

Shall Georgia send out into other states and ask them to come over and teach us how to farm? This is not our plan in securing leaders in other affairs. In this case this will be very humiliating, especially since our chief occupation is farming. Our educators and great thinkers on other subjects are mainly native citizens. This state of affairs at least does not reflect credit upon us and is chargable to the young men of our state, most especially the University men. The harvest truly is great but the laborers are few.

W. W. LANG.



Agriculture

The definition of Agriculture, as understood by the majority of mankind today, is a very narrow one indeed. Agriculture is not only the aiding of those plants, which satisfy the highest form of civilization, to gain superiority over plants of less use, but also preparing the soil, selecting seeds, sowing reaping, harvesting, raising and feeding of cattle and other live stock.

"Every other profession grew out of the needs of the agriculturist, and every one in turn is dependant on him for his support. The farmer needed tools with which to cultivate his crops, hence the blacksmith came into being. He needed houses, hence the carpenter. He needed schools for his children, that they might not grow up in ignorance, and thus the teacher was called forth. His religious wants called for the minister. In time legal rights demanded laws, hence the lawyers, judges, etc. Disease called for the physician, and increased trade brought into being the merchant, banker, and trader.

"When the curtain of civilization first rises on the stage of history, in the favored region of the Valley of the Nile, there were nations and civilizations already numerable with age, and possessing languages, arts, and institutions that bear evidence of slow growth through very long periods of time before written history begins."

And when history did begin, Agriculture received very little attention from the historians. But through all the ages past we get glimpses here and there which throw some light upon its condition.

The very first knowledge that we have of agriculture in any form was on the Nile river, which was renowned for its immense corn crops, in the time of the Jewish patriarchs, who tehmselves were keepers of flocks and herds.

Naturally very little is known of the methods employed at this time, but we do know that the implements were very few and simple. The ground received three ploughings, one in the autumn, one in the early spring and another immediately before sowing. Fertilizers were applied, and the advantage of mixing the soil was understood also. They rotated their crops, letting their land rest every two years. Seed was sown by the hand and covered with a rake, or herds of cattle were driven over to tramp the grain in.

Rome, before Christ, consumed 20,000,000 bushels of corn each year, which shows that they were successful corn growers, at least no matter what methods they applied or what implements they used.

We find that Job had 500 yoke of oxen, which he used in cultivating the land. Isaac sowed grain and reaped one hundred fold. The Israelites were one of the greatest agricultural nations of antiquity. They plowed the lands of Canaan and Judea. We find that they kept the stones cleared from their fields, terraced their land, used canals, irrigated their lands and used a fertilizer, which they called guano. Their crops consisted of wheat, mullet, barley, rice, and some cotton.

In India the people were divided into three castes, merchants, machinists and farmers. This in a few words is something of the history of ancient agriculture.

The history of agriculture in the United States dates back, we know not how far. But we do know that when the first settlers reached America they found here a tribe of people who depended to a certain extent on agriculture for their living. They planted corn and bean patches, manuring them by placing fish around the hills. They, though primitive races, taught the white man new things about agriculture, and taught them the use of several new articles of food, principally Indian maize, known to us as corn. It is interesting to know that every attempt to colonize America failed, until the English made a settelement and began the pursuit of agriculture. Their implements consisted of the hoe, scythe, rake, and a very simple plow.

Since that time no other pursuit has made such rapid progress. And no wonder, since the vast territory of the Uinted States presents every variety of soil and climate. Its agriculture embraces all the products of temperate and semi-tropical climates. The agricultural implements of the United States exceed all those of other nations, in their wonderful adaption for all purposes of cultivation and harvesting of crops. So successful have been our farming implements in other countries tha the supply at home has been impeded. The disposition of the American to experiment, to test improvements, and adopt labor saving machinery gives a great impulse to scientific farming.

Then in view of all these facts is it not almost compulsory on the teachers of our country to give agriculture a prominent place in our school curriculum? Then and not until then, will agriculture be given the prominent place it deserves. And there are many vital reasons why it should be placed along with Latin, Mathematics, English, etc. In fact, we believe that it ought to be given more attention, not only in our common schools, but also in our high schools and colleges. For the people of the entire world depend on it for their sustenance, and the scale of civilization of every nation today is judged by its agricultural methods. Then is it not time that we were waking up to our real position? And one of our great objects should be, I believe, to free the mind of the people from the absurd idea that a farmer needs very little or no education. The time has come when he must be one of the very best educated men of our country. And why? In the first place, a large per cent. of the population of our state are farmers. Then in their hands is the balance of power. It is they who determine the laws of our state, at the ballot box.

Second, the generations who have preceded us have almosts runined the land, by improper cultivation. They have cleared the forests and filled the streams. And this my friends, was certainly done by the ignorant, though they might not have been to blame. Time was when we could move from the worn out lands to richer fields. But the great West has been settled. The rich valleys of California were filled many years ago. Then the only alternative for the farmer today is: to build up his farm, take care of his forests and dredge the streams. This must be done by wise and experienced men.

We must be educated to keep abreast of the times in which we live. The time has come when the farmer who wishes to succeed must not only know that a piece of work must be done, but how it must be done. He must know, not guess.

There are two requisites for a successful farmer. The first is: He must be able to make plans and execute them. The second: He must know the principle involved in growing crops and selling them. To know these, he must inquire into the secrets of Biology and Chemistry ,of Botany and Physics, of Geology and Astronomy, of Mathematics and English.

"It requires more brain to run successfully a six-horse farm than it does to run a bank or a railroad. And when we get our farms managed by educated men, we will rise to the full dignity of our profession. Then as the peers of any we will be respected and consulted by all. Brain rules the world. Brain directs muscle. Let the farmers carry their full share of trained minds, and they will stand among the counsellors of the nation."

LUTHER F. ELROD.

The Importance of Southern Forests

Forestry is of very recent origin in this country. Not only has the forest been neglected and the timber alowed to waste but the foest was thought to be a hindrance to the progress of civilization. This idea was probably not altogether wrong when the Colonists were building the first homes and opening the first farms on the Atlantic coast; but now it is a national question with us what we can do to save the forest from destruction and use its products most economically.

The question of preserving the forest in order that we may not have a timber famine is of such importance that the national government should enact more stringent measures to protect our resources for a future supply. This matter has been considered in the last session of Congress but for some cause practically nothing was enacted. The question of preserving the water power of the inland streams and preventing the harbors from being filled with mud and sand is also one that the national government should consider. It is now well known that the value of all rivers for furnishing water power or for navigation is almost completely destroyed with the removal of the forest cover of the mountains and hills that are drained by the streams. Not only this but the seacoast harbors are filled with the soil and gravel deposited at the mouth of the rivers. These matters are of such a social nature that the individual interest cannot be expected to act in harmony with this social interest without some legislation by the nation. But it is not the purpose of this paper to enumerate the duties of our law-makers and show how they should be interested in forestry, but rather what I shall say is addressed to the farmers of this state as individuals.

It is true that the perpetuation of our timber resources is a national question, but as timber gets higher in price and more difficult to obtain the farmer finds it very expensive to do any building or repairing when the timber is to be bought. So it matters little to the farmer what Congress does as to the forest reserve, lumber is already very high priced and the price will not be likely to fall but rather go still higher. If we will investigate just a little I think we will find it would be more profitable for the farmer to have some of his red hills growing pines rather than to be trying to grow cotton on them. But most of the farmers will not have to resort to the old fields to grow timber, but only need to care for the timber that is already started on the small tract of wood land on the farm. Most all farms have some land that is too rough or for some reason not suitable for farming purposes. Such plots can be made to produce timber and thereby bring in a good revenue if only a little care is exercised in protecting the timber. If the farm has no such wood lot and also there is no low grade land that would be more profitable in forest than in agriculture, then it would be well to buy some land of less value for this purpose. This kind of land can usually be had much cheaper than land suitable for fild crops.

The wood usually gets no protection and yet it produces some timber and possibly brings a small income; but if the same lot was put under proper management the income would become very profitable and still the forest increase in value.

The greatest loss probably is caused by fire which is allowed to run through the woods often by carelessness, and again to make the grass grow for pasturage. The fire does damage to the mature trees more than is realized without close notice. Many trees are burned so much that they die and others that do not die immediately are blown down with the first wind. This damage is very apparent, but the trees that have enough vitality to keep up some kind of a growth do not show so well the damage they have undergone. The fire will check the growth of the large trees so that a very considerable loss is caused this way, and besides the timber is not of the best quality where the fire is allowed. The fire also stops reproduction and this is of even more importance than the damage to the mature trees. The sedling trees are not able to get above the fire line between fires so that there is no young growth to come on for a future timber crop. Not only are the young seedlings burned to death but the litter is burned so that the soil is depreciated and dried so much that the seed do not germinate without difficulty.

In the most of cases where the owner sells his timber to a mill man the methods of harvesting the timber are so wasteful that a large percent of the valuable timber is allowed to go to waste. In the first place the stumps are cut so high that several feet of the best part of the tree is left in the stump which makes it more in the way than if it had not been left. Also the men that cut the trees do not cut the logs so that all of the top of the tree is utilized. When they are cutting for 12 foot logs and there is five or six feet left generally it is wasted instead of putting it in so that the last log would be 16 or 18 feet and not the regular 12 foot log. And the tops should be used also for wood and not allowed to rot in the woods where they will spread disease among the young growth.

The farmer can grow the timber that he must use on his farm with much less outlay than it would cost to buy it, and he will find it profitable to grow more than he consumes on his place for he can get good sale for all first class timber. He would probably find it to his interest to sell some of the more valuable timber.

It is very necessary for every farm to have a small wood lot to produce the firewood and lumber for the farmer's use; and the income from such wood lands is coming to be more and more desirable, but there is a secondary value that should not be overlooked. The time has been when the by-product of most industries were not utilized, but now they are all used and in many cases form the most of the profit. Some industries have begun to produce one commodity solely and later some of the wast product was found to be the most valuable part of the out-put. This may come to be the case with our forests, indeed this is now counted the primary use of the forest in the prairie. The effect of the forest on the climate and seosons is a very great service that the people of the South have not considered herttofore. Indeed this is enough in itself to authorize each farmer to kep a small tract of wood land near his home. It will materially effect the running water on his farm which is no small matter. A never-failing spring of pure water is worth many acres of land if conveniently situated to many farmers; such a source of water has often been sacrificed by clearing all the lands immediately surrounding it. It is very seldom that a spring of water does not dry up or become dry most of the year where all of the forest is removed. The forest acts as a check so that the streams are more constant all the year round when they flow through the forest. Erosion is largely prevented by the trees and their roots. This is important not only from the saving of the soil but also from the quality of the water for stock. It is useless to say that a modern dairyman knows he cannot afford to allow his cows to drink muddy or impure water so the question of pure running water is worth considering.

The forest is not subject to the extremes of temperature either. It is warmer in winter and cooler in summer. This has a tendency to distribute the rainfall and a very marked effect on the evaporation of the moisture in the air and soil. The temperature is affected directly to several degrees. Also the trees form a wind break so that the sharp winter winds, the most disagreeable part of cold weather, is stopped.

The forest has certain physiological effects on the body of man. The trees purify the air. The mechanical part of checking the wind and thereby causing the sand and dust in the air to be deposited is one of the ways in which this is done. The fine dust particles are the carriers through which the disease germs are dissemminated. Also there are certain exudations of some trees that seem to act as a germicide in the air. This is particularly true of our Southern pine. Hospitals for some invalids, and especially those with lung trouble, have been placed out in the pine forest for this reason.

The most of our birds hibernate in the woods. The birds are very helpful to the farmer. They help a great deal to keep the troublesome insects in check so that field crops are not completely devoured by them. Without these insects destroyers most lines of farming and gardening would become wholly unprofitable, so it is very good business to aid the birds all we can and give them a place in which to lodge and multiply. The forest is well nigh indespensible to most of our helpful birds. They winter in the trees where the winter cold is not so severe and where the litter preserves some food. Not only does the forest furnish protection from cold but it also furnishes food when the birds would starve in the open.

Now I think these secondary benefits from the forest will appeal to the intelligent farmer as worth some consideration. The reason this indirect utility of the forest has not been emphasized is because we have not yet destroyed the forests and so have always received these advantages without realizing that they were dependent upon the forests. I have no desire to raise an alarm but in those countries where the forests have been completely removed this is stressed very much and this is counted sufficient reason in itself for the outlay necessary to recover the forests. It does seem that we should gain a little from experience of these countries. So why should we wait until the forests are gone to begin to practice forestry methods? It would be much better business to try to save the forests and harvest the mature timber economically before the timber is all gone and the woodlands become wastes.

It is very much hoped that the State and National governments will take some steps soon toward creating a large forest reserve in each state, but we need not wait for the government to do everything. Wood lands bring a very good income on the investment, and it would be very poor policy for an individual not to invest in forest lands just because his neighbor is benefitted some from the trees that grow on another's land. Besides the state will do a lot more for this interest if it is evident that the people are doing something themselves for the preservation of the forest. So we can hasten the passage of the bill for the Appalachian Reserve better by taking care of what trees that come within our control than by talking to our congressmen. WM. W. LANG.

The Purpose of Agricultural Education

BY PROF. ANDREW M. SOULE.
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The object of all education is to teach men to think, to reason accurately, to be logical in their conclusions, and with all, more liberal with their views of life. True education broadens the horizon of the student and gives him a grasp of the fundamental facts relating to the special vocation which he expects to follow through life. The educated man thus becomes one of the dominant foctors in the universe of which he forms an integral part. The aim and object of agricultural education is in perfect harmony with these suggestions.

The courses in agriculture are designed therefore, to provide instruction in mathematics, literature and languages, as well as in the fundamental sciences pertaining to climate, soils, plant growth. animal evolution and the transference of the inexhaustable store of wealth locked in the bosom of nature into forms that will assuage the needs of mankind. In other words, agricultural education teaches us how to enjoy nature's gifts, to feed the world more economically, nourish the body and hence develop the mind of man to the highest possible degree, clothe the world perfectly and bring joy and hope and inspiration to thousands of toilers who, unacquainted with the laws of nature, are but mechanical factors in a universe teeming with opportunities.

To provide the training needed the agricultural student receives instruction in breeds of live stock of which there are more than sixty in America alone, varying in size and character from the tiny Shetland pony to the huge Clyde and Shire, and from the marvelous milk producing capacity of the Holstein to the remarkable beef making propensities of the Shorthorn.

Darying is now practically an exact sciene and the transformation through which milk and butter pass, and the various fermentations, desirable and undesirable, to which milk is subjected in the manufacture of butter and cheese form a part of the necessary training of an agricultural student.

The handling and management of live stock and the intimate study of the laws of breeding and reproduction from important links in the course of instruction. When we realize that fifteen distinct breeds of horses have been evolved from the parent stock through the agency of man, the comprehensive nature of this subject becomes apparent. A scrub cattle beast may dress out some forty per cent of its live weight; through breeding and selection of animals have been developed dressing out seventy per cent, or more than thirty pounds of good meat to each hundred pounds of live weight. This fact applied in practice would revolutionize the animal industries of America, and it is for this reason that so much emphasis is laid on stock judging because men through training can become so expert as to pick out good and bad animals for the many purposes to which they are adapted. Stock judging, in other words, is a subject of as much importance relatively as the work performed by a mechanical student in a foundry.

How shall we nourish our live stock economically? Is there a problem correctly solved that means more to the progress of the American nation? The nutrition of the human race constitutes one of the profound studies of medicine, and many savants have given their lives to the investigation of this intricate problem, for progress in the arts and sciences keeps step with the proper nourishment of the human body. Similarly, the proper combination and economic administration of food stuffs to our live stock is a fundamental problem to agricultural progress, and hence it is but natural that this subject should receive elaborate consideration.

Our student must be familiar with the construction of farm buildings and the installation of the necessary equipment. It seems simple enough to build a silo until you undertake the work. How to plan and build a dairy barn so as ta secure economy of space, ventilation, sanitation and permanency are matters of great concern.

How does the plant grow? Can we so change the soil as to adapt it more perfectly to the needs of growing plants? Can we warm or cool the soil at will? Can we drain the soil and so aerate it. Can we increase and decrease, conserve and destroy the available plant food in the soil, which in turn measures, not only the yield, but the cost of crop production and the permanency of the agricultural wealth of the nation, and so directly affect every industry developed within our borders? Can we conserve and utilize our forests more advantageously? Is it necessary for us to understand the various ferments, good and bad, the various forms of bacteria, useful and detrimental in order to grow crops more successfully? Must we understand the various forms of fungi and the life history of predatory insects which prey upon our orchards and gardens? Can we through a careful study of our farm crops evole principles by which the yield and quality of them may be materially increased and their natural characteristics so changed as to adapt them better to the needs of the human race? If we have a knowledge of vegetable pathology and of the thousand and one questions involved in the magic word chemistry, will our student not have a better grasp of nature, and nature's laws; and so become an intelligent servant of the nation because of the wide, clear-cut and comprehensive view he has of the relation of agriculture to the progress of civilized nations? And when he has acquired an insight into some of the subjects but briefly referred to here, has he not received a liberal education, and a useful training of the mind and hand that makes him the equal of any other man as productive agent and as a leader in thought and actian that will result in the preservation of the rich gifts which nature has so lavishly bestowed upon the American farmer?

Correct agricultural practice, which is co-ordained with the highest type of education and the cultivation of the noblest instincts of the human race, means not alone the cultivation of our soils, but their permanent preservation for future generations. Those who are familiar with agricultural conditions in the South today must realize that of all the problems with which our people have to deal there are none so vital, none so far-reaching, and none which will have such a permanent influence in determining her future status as the education of her sons to appreciate the true principles on which successful agricultural practice is based. When this condition is brought about the streams of wealth gathered from nature's lavish store through crude and indifferent agricultural methods will be quadrupled and permanent prosperity reign supreme throughout the land that will outshine in its glorious reality the fame of Alladin and his marvellous lamp.

The success achieved by educated farmers everywhere cannot be dwelt on at length here, but men of this type are now becoming so widely distributed that he who runs may read and profit if he will. Every field of education is important, and he who would arrogate to his own all that is good and useful is simply filled with narrow provincialism. On the other hand, agricultural education has had to fight its way from the beginning, not only meeting opposition from those whom it was designed to assist, but of the so-called cultured classes as well; who, unfortunately in many instances, have not taken sufficient time to acquaint themselves with the aim, object or purpose of agricultural education or the noble ends which the crude attempts along this line up to the present time have accomplished. The value of agricultural training is a matter which has been seriously overlooked. The fact that men work with nature and that the hand is trained along with the mind does not mean that agricultural education is narrow in its purpose or that there is not as much beauty and pathos, philosophy and logic in the corn plant as in the dim and dusky pages of history and ancient mythology. The man who was educated in the old school and who thought it clever to ask "how many teats a cow ought to have" was an example of narrowness and ignorance that was pitiable in the extreme. It is un-American to hold such narrow views of life, and men who persist in believing that agricultural education is but a myth-a subject beneath their notice, when they have held themselves aloof and not even investigated the matter sufficiently to discuss it intelligently, are closely akin to that celebrated long-eared animal from which all useful quadrupeds of the horse type have descended.

Forage Crops of the South

The subject of forage crops is of paramount importance to every Southern farmer, and every one that has the interest of the South at heart may well be concerned about the cultivation of these crops. Our soil and climate invite us to raise more leguminous forage crops and receive a good return for our labor and at the same time save our land. While we have such great possibilities for raising such crops, we have not taken advantage of them. Indeed the South lags behind other sections more in this line than in any other. But we may rejoice at the fact that she is fast awakening from this lethargy. It is hoped that the time is near at hand when the Southern farmer will take advantage of these wonderful opportunities. When we have the best conditions for raising these crops, it is not wise to buy them from any one, and pay the freight extra.

We have many forage plants that do well in the South. Our mild climate, moist atmosphere, and variety of soils make it possible for us to grow profitably a great number of forage crops. We can have good pastures and meadows most of the year. We have many grasses that will make good grazing and hay crops without much attention, except harvesting, on land where nothing else will grow; but it is impossible to speak of many of these crops in a paper like this. Inasmuch as we must limit ourselves to a small number of the plants, it is considered best to speak of those crops that are of the greatest importance. In deciding what plants to treat of, I have considered two things: (1) the value of the crop produced by each plant compared to the cost of raising and harvestsing it; and (2) the effect that the crop will have upon the soil, which consideration is of great importance.

To treat this subject intelligently, it is necessary to classify the various forage crops. There are many different classifications; but in my cuassification, I have two considerations in view, (1) the purpose for which the crop is grown and (2) the kinds of plants with ereference to the effect they have upon the soil. Speaking generally, forage crops are grown for two purposes; (1) for grazing and(2) for making hay or as a soilng crop. There are two general classes or kinds, of forage plants; belonging to one class are the grasses which are non-leguminous plants, and to the other class belong to the leguminous plants, which are the principal varieties grown on the cultivated lands. They are grown mostly for hay or soiling; and quite often they are grown for both purposes. The legumes, which are by far the most important class, extract nitrogen from the air and deposit it in the soil, a property which gives them great value as soil builders.

There are many forage crops that deserve special mention. We have a large number of fine grazing plants that are admirably adapted to the general conditions of the South; and there is no soil in the South on which some of these crops cannot be grown. By proper management there would be a good pasture on every farm; and the same thing is true of the hay and soiling crops. Every farmer can have green feed, or soiling crops in the early spring and late autumn, when pastures are not good; and he can make hay to feed his cattle and horses through the winter, and more than that, he can have some to sell. But is is not possible for me to speak here of all the valuable crops that we may grow. I shall speak presently some of the crops that we may grow. I shall speak conditions of the neitre South. Then there are many places where these plants will not do well on account of some local condition: but a paper that deals in a gentral way with the subject of forage crops cannot be expected to work out these local problems. Due consideration has been given the general conditions in the South and the conditions under which the plants with which I propose to deal grow to the best advantage, and it is therefore believed that the forage plants spoken of in the following paragraphs are the most satisfactory ones for most of the Southern soils.

Bermuda grass is the best hay and pasture plant grown in the South for all soils that are not too wet. It is the most common and has the most vigorous growth of any grass grown in the Gulf States. Its growth is so compact and its stems lie so close to the ground that it makes an excellent lawn grass. It stands droughts remarkably well, and frequent cutting and heavy grazing make its growth more rapid. Its roots are so strong and grow so compactly that it is a splendid soil-binder. Bermuda grass cannot be excelled for grazing and it should be used in the Gulf States as the foundation for all permanet pastures. It is also one of our very best grasses for making hay. When the seasons are favorable it will mke two and occasionally three cuttings, and on good land it commonly yields from two to four tons of excellent hay per acre.

Crab grass furnishes most of the hay for home use in the Gulf states. On cultivated lands it is the most common grass and it makes its growth in late summer, after other crops have been harvested or laid by. It thus furnishes a large amount of fine hay with no expense except harvesting. When wheat, oats, and other early crops have been harvested, it soon covers the ground, and by early autumn will be ready for harvesting, often making a yield of about two tons per acre. In the pine wood lands, and coast lands it will yield almost as large a crop on land from which other crops have been harvested in August. It is the checapest hay crop we have for it sows its own seed and demands no attention but harvesting.

Sorghum is also one of our best non-leguminous forage plants. There are very few forage plants that will flourish under so many conditions of soil and climate as it does. Its tendency to adapt itself to various conditions of environment has produced many varieties, which differ in degree of sweetness, habit of growth, and length of time required to reach maturity. It is one of our most valuable forage plants and is very extensively cultivated. Sorghum yields very heavy crops of excellent hay; generally it is not injurious to the soil; it hardly ever fails to make a good crop; and it also makes a fine soiling crop, and is one of the principal sources of food for both man and beast.

Many more plants of this class deserve mention, but the lack of space prevents the further treatment of the class of forage plants known as grasses, or non-legumes, except the mere mention of three of the most important ones. Foxtail millets make good crops on some of our lands; it improves the condition of the soil; and some varieties make a very good crop very soon after the seed have been sown. Redtop and Texas blue grass are of much importance, for they furnish good grazing for winter when it is badly needed. The former grows best on low, damp soils and should be in every pasture that contains land that is too damp for other grasses; the latter flourishs in a rich loamy soil. Both of these plants are of great importance for winter grazing.

Alfalfa is one of the leading leguminous forage plants of the South, for it is a great soil builder and hay producer. The hay is of extra good quality and the yield per acre is much greater than any ordinary plant prodlces, it often being much as eight to twelve tons per acre in one year. Another great advantage is that it is not necessary to sow the seed every year for Alfalfa lives several years when once established. It is a valuable forage plant because the production of excellent hay is very abundant while there is very little expense other than harvesting; and it is very beneficial to the soil for it transfers nitrogen, a very fine fertilizer, from the air to the soil.

The cowpea is the favorite forage plant of the South; for it produces large crops of the very finest hay on almost any soil in the South; and it improves the land as much as any crop that can be grown. A field of cowpeas has been very properly designated "the poor man's bank;" for in common with all its leguminous congeners, the field pea, alfalfa, clovers, and a score of others, this crop increases the fertility of the soil upon which it grows. There is no forage plant that is more admirably adapted to the needs of the farmer and conditions of the soil and climate than the cowpea. It thrives on both the rich moist lands and the dry, sterile, worn-out, hillsides, producing a greater quantity and a better quality of forage than any other plant, and when grown on a piece of ground, the soil is left much richer in nitrogen, a very valuable plant food.

The velvet bean is a very important forage plant; but it is so much like the cowpea that I shall not deal with it at length. What was said of the cowpea may be said of the velvet bean; it is not necessry to repeat what I have just said. The two grow under the same conditions; they have the same effect upon the soil; and the velvet bean, like the cowpea, produces a large crop of very fine hay.

Winter vetch grows under much the same conditions as the cowpea. It is especially desirable for winter soiling purposes and for early spring hay; for if sown in the summer it will produce green feed for November and December, a period when feed is greatly needed, and then it will make a good crop of hay in the early spring. The plant thrives on any dry soil that will produce cowpeas; it is valuable as a hay and soiling crop, improves the soil, and should be more extensively cultivated. There are several varieties of clovers grown in the South, one of which deserves especial mention. Several of them, especially red clover, make good crops in some sections under very favorable curcumstances; but Japan clover is the only member of the family that is very extensively grown in the South. It is among the most valuable leguminous hay and grazing plants of the Gulf States. It grows on most all soils, even in hard clay or sand; but it does best on loamy soils which are fairly rich in lime. Stock eat it very readily and it is a very wholesome food for both cattle and horses. It affords splendid grazing from May until late autumn. While it is generally used for grazing it is also a splendid hay plant, often producing over two tons of hay per acre in one year. It is one of our leading forage plants; and it is one of the best soil building plants that we can grow.

We now come to the very important question of considering what place the above forage crops occupy in a system of crop rotation. On account of their very nature, many of these crops have no place in an ordinary system of rotation, because they occupy the same land for a number of successive years. Among this number are Bermuda, Alfalfa, the clovers, and many others—in fact most all of the grazing plants and some of the hay plants. There is another difficulty in arranging a system of rotation which would include all of the crops; one system is suited to one section when it would not do for another. The following system is the best for the South generally, but local conditions often necessitate changes in this system, which is the three year rotation. The cultivated land of the farm should be divided into three equal portions; and one division should be planted in cotton, one in corn and peas, and the other in wheat, oats, or vetch, followed in the spring or summer by peas or velvet beans. It is often advisable to sow some sorghum with peas; and it is often planted alone for making a soiling crop, and may take the place of corn in the rotation. In the three year rotation, cotton would be followed by corn and cowpeas or velvet beans in the spring, wuld occupy the land. The hay crops are cut off in the summer and the land is left in good condition to make cotton the next year.

There are several great advantages in raising more forage crops in the South. It necessarily requires more diversified farming, and especially the growing of more forage crops and live stock, to be the proper course for the Southern farmer to pursue in order to make the South the best and most desirable farming country in the world. We have great advantages over other sections in climate and soil; we should show our intelligence by using these great opportunities.

There is no other class of crops that gives so good returns for labor and expenses as forage crops do. These crops make splendid yields, often more than cotton or corn would make, and there is but little labor or expense required except harvesting, and that is less than the cost of harvesting other crops. There are many examples that illustrate the great benefits to be derived from raisng hay, some accounts of which seem incredible to people who have not given these hay crops a fair trial. Recently an Alabama lawyer inherited four hundred acres of worn-out land for which a real estate agent refused to pay two thousand dollars. The lawyer raised a crop of cowpea hay for which he received eight thousand four hundred dollars, and the entire expenses of sowing, harvesting, and marketing was only two thousand four hundred dollars; he therefore made a clear profit of six thousand dollars, or three times the amount he offered to take for the land. That is not all that he gained; for the same real estate agent that refused to buy this land now offered him ten thousand dollars for it; so his land gained eight thousand dollars in value in one year. By adding the incrceases in the valule of the land and the protfi on the crop of hay, we find that this man made a clear profit of fourteen thousand dollars in one year on an investment of only four thousand four hundred dollars.

These hay crops improve the soil as in the above case, by feeding on the nitrogen of the air and leaving this valuable fertilizer in the soil. There is also another way that growing of farage crops improve the soil, it encourages the raising of cattle by furnishing an abundance of feed; and when the hay is fed on the farm much more of the nitrogen taken from the air is returned to advantage to the soil. The raising of live stock should be encouraged, for it is a profitable business and when the farmer realizes it, one more step will have been taken toward diversified farming, and in this way the forage crops will help solve one of our greatest problems.

The rasing of forage crops will prevent over production of cotton, which is a strong argument in favor of such farming. It is admitted by all that the South produces too much cotton; but if the land was used more for cereal and forage crops there would be no surplus cotton raised; we could raise our own meat and feed for our stock ,and not be compelled to buy it for more than it would costs us to raise the meat and feed, not considering the extra freight.

There is another argument in favor of more forage; it would solve the labor problem. At present our labor is inadequate; but if more land was given to forage crops and the cotton crop greatly decreased, labor would not be scarce, for it requires less labor to raise forage and cereals than to raise cotton. There is still another great advantage in this method which is really a part of the labor problem. It would enable many a coutry boy, who must now help raise a big crop of cotton, to attend school.

From every possible standpoint it seems advisable for the Southern farmer to turn his attention to diversified farming and especially to the raising of more forage crops. We can raise better hay and more of it than any other section. Why should we pay freight on it from anywhere, rob our soil by raising cotton continuously, and ship our meat from Chicago in order to raise much cotton Science shows that it improves the soil to grow the legumes, and practice has often demonstrated it fully. Then the time is here, and let us hope that he will see it and take advantge of his opportunity, for the Southern farmer to make himself independent of other sections. He has been an infant in the hands of cruel and discriminating nurses; but he is now a strong man; and he should stand boldly upon his own solid foundation, (the Southern farm) and lean no longer upon the arm of his former master.

R. L. NIXON.

Immigration for the South

Do we need immigrants in the South? Have we sufficient laborers to till our soils, to operate our mills and to develop our resourcs? Ask the two industrial classes—the farmer and the manufacturer. The former points to an idle mule; the latter to an unoperated machine. Not only is labor insufficient, but there is also no prospect to relieve the scarcity with material now at hand. For, theoretically increased capacity to work depends upon two factors—wages and education. Large wages should enable the laborer to supply his bodily needs and maintain a standard of living conducive to physical health; while education should teach him the art of accomplishing most works with the least expenditure of energy. Put the theory in practice with our laborer, the negro, and note the effects. In times of prosperity and large wages, the negro, instead of raising his standard of living, continues to live on the same level, but lessons his time to work. Education has never proved an asset to him, industrially. Whether this is due to the kind of education he is receiving or due to some fault in the negro himself is not to be here discussed, but this is certainly true: labor is scarce and is becoming scsarcer, rapidly, and relief must come from some source other than the negro—from the immigrant.

A great many thoughtful citizens who otherwise see the need of immigration, object to it on the grounds that the slum element of advanced nations and all classes of undesirable races may be brought among us and thereby intensify our already baffling race problem. This is not really an objection to immigration, it is simply an aversion to that class of people whom no one advocates bringing over; who are debarred by law from our land; and who, as shown by statistics, are not immigrating to this country I, for one, altho ardently in favor of a certain class of immigrants, advocate debarring all peoples against whom we of the South entertain race prejudice. However, having studied the question, I arrive at the conclusion that the people of Georgia and the South can by the exercise of common sense and a rigid enforcement of the restriction laws, get a class of immigrants against whom no one is prejudiecd, and with whom our native whites will readily amalgamate.

The nunmber of immigrants from Northern Europe coming to this country in 1905 is surprising, and the amount of money each brought is large, relatively speaking. The statistics taken from the reoprt of the immigration bureau bearing on these points are as follows:

German	40,574	$89.00	$ 3,600,845.00	4%
English	64,709	45.00	2,911,000.00	1%
Scandinavian ..	61,655	25.00	1,604,205.00	1%
Irish	52,945	26.00	1,421,682.00	3%
French	10,168	91.00	931,093.00	3%
Scotch	16,977	47.00	310,678.00	1%
Total	247,028			

Are not these, the races from which we sprung? If we object to them, we go back on our ancestry. Here are 247,028 immigrants representing the leading nations on earth, from which we may select. Altho all these people come from excellent stock, yet some of the individuals are undersirable. The restriction laws prohibit this element—the paupers, criminals and diseased from landing on our shores.

Take the thrifty Germans as an example ,and fathom the meaning of the amount of money they bring over. In the first place, it means an addition of $3,600,845 yearly to our currency. In the second place, it means refutation to the objection of immigration on the grounds that only the slums of a country emigrate Each German immigrant, besides having earned a livelihood in his thickly populated country, and paid his passage to the United States, arrives here with the capital of $89. It is true this amount is not much within itself, but it is enough to speak well for the thrift and industry of the immigrant whose "all" was earned by the sweat of the brow, in a country of limited resources. Let us cast our prejudices to the wind and be governed in this matter by facts, figures and common sense.

The questions naturally arise: why is it that all the immigrants go to the North, and how can we turn the tide South? They go to New York, Massachusetts, Illinois, and other eastern and western states simply because these states, realizing the possibilities in the immigrant advertise their advantages in foreign countries. To turn the tide South is easy, for in all cases the immigrant is seeking that location offering the best "opening," and this place is, undoubtedly, the South. We need never expect our quota of those immigrants who enter this country through the ports to the North of us, for there the immigrant is so much in demand that if he proposes to come South, certain false reports derogatory to the good name of this section are circulated in his hearing, so I am told. Then, to bring immigrants to Dixie it is necessary, first, to advertise our superb climate, our fertile lands, and our unparalled opportunities and, secondly ,establish a trans-Atlantic steamship line from some Southern port to the Northern countries of Europe.

Having seen that the South can get any number of good immigrants, we may now speculate upon the effects immigration will have upon her indnstries. On account of their small capital and their ignorance of our conditions, all the immigrants will, for the first few years, be day laborers in different occupations, according to their taste. Some, in the nature of things, will work in our mills. They will in proportion to which they enter this field of endeavor, bring to a complete fulfillment the hope that so many of us cherish—that some day the South will not only continune to be looked to for the world's supply of cotton, but will also become the chief centre of the manufacture of cotton goods. The North has already realized that the South, by moving the manufacturing centre to the seat of cotton production, will have a tremendous advantage over all other sections of the country. The New England manufacturer knows further, that the main drawback to a speedy materialization of this advantage is not the lack of capital, but the scarcity of labor, consequently he is making strenuous efforts to keep the foreign laborer out of the South.

Now, you short-sighted farmers who are fighting an influx of good laborers, because you are afraid a few bales too much of cotton will be produced, stay your protest until the South has gotten enough labor to manufacture every lock of the cotton which she produces. You boys who think the sun rises and sets in cotton, who raise cotton and buy corn, who plant cotton in your onion rows; you, and not the immigrant will be responsible for every disaster resulting from an over production of the cotton crop. Furthermore, you need through association with the immigrant to learn the versatility of your soils—to learn that many crops other than cotton can be grown profitably on your lands.

Owing to the splendid opening in this line of work, a great many immigrants will be attracted to the farms. There are thousands of acres of tillable land in Georgia devoid of renters. These lands the owners have in a great many instances offered free, for one year, to the good and industrious foreigners. The most thrifty immigrants who acept this liberal offer will buy in the course of time these same abandoned lands at what now would seem an enormous price.

Now, land is a commodity that can neither be increased nor decreased; it is a constsant quantity. The Almighty gave to humanity so much, and humanity can acquire no more. Again, land, differs from other salable necessities in this one particular; the more it is bought and sold the more it is worth. So, by virtue of the fact that land can neither be increased nor decreased, the smaler the plot of ground that each unit of population owns, the greater the value of each plot. That is to say, if we sell that surplus of land that is now lying idle or being run down by tenants to people representing an addition to the population, we not only receive ample pay for the land sold, but we also get the indirect benefit of having the part of the land retained worth as much under the new conditions as the whole was under the old. Then, too, experience teaches that the value of land rises in direct proportion to the increase in population. Stated differently: If one-third of the land in the state of Georgia was sold to "outsiders," the two-thirds yet remaining in the hands of the natives would have increased in value to the extent that it be equal to the oriignal three-thirds. The immigrant must buy the surplus lands and become the agent through which our farms increase in value.

The immigrant will improve labor conditions. There are many farmers in the state who are ready and willing to operate their business with white labor only. They realize that the North has forged way ahead of the South in the use of labor-saving machines and in the adoption of improved methods of farming. They realize further, that this progress was made possible through intelligent laborers—immigrants, consequently they are anxious to try the foreigner. Now, every farm that accepts the white man will debar the negro, therefore, the negro, to hold his own will be forced to become efficient and reliable—two characteristics woefully lacking at present.

The citizens of Georgia are beginning to realize that the progress of their state depends upon her agricultural development. To further this development the legislature has authorized within the last year the establishment of eleven district schools whose faculties are expected to give instruction in the different branches of elementary agriculture, and has also appropriated $1,000.00 to be used in the bettering of the equipment in the department of agriculture in the State University. This is a step in the right direction. The legislature and the people are to be commended for it. But this is not all, in fact it is only half. We may have our fine buildings and our learned agricultural professors and yet without students to attend the schools and to engage in farming after graduation, we add not one iota to the development of the state or to her progress. Why is it that the farmer who is able to give his son only a few months at college, instead of sending him to an institution offering a short course in agriculture, encourages him to attend some business school? Is it because he thinks a book-keeper is more honorable than a farmer? No. And why is it that the "well-to-do" farmer, who after giving his son the advantage of a collegiate education, advises him to study law or medicine instead of agriculture? Is it because city life is more conducive to good health and good morals than life in the country? A thousand times no. It is because he has learned from that hard teacher—experience—that any vocation is preferable to farming under present intolerable labor conditions. If the attendance upon the agricultural schools is less in proportion to the quality of the course offered than should be expected, it is because the young man, having an opportunity to prepare himself for any field of endeavor, is selecting that calling in which success or failure is not dependent upon labor conditions. Therefore, hand in hand with the movement for better agricultural schools, must march organized efforts for the introduction of more labor and better labor—for the introduction of immigration—before the progress that should attend scientific farming can be realized.

JOHN A. SIBLEY.

Incomes from Southern Farms

Without a shadow of doubt agriculture is the greatest wealth producing occupation followed by mankind. The United States possesses greater agricultural opportunities than any other land upon the face of the globe. The tillers of American soil are in better condition financially than are people engaged in the same line of work in other countries. The returns in proportion to the capital invested in farming are greater in the South than in any other section of the Uinted States, and perhaps of the entire world.

The following from the Manufacturers' Record of May 9, 1907, bears upon the above points:

"While the farm investment in the rest of the country yielded in 1900, according to the census, a little more than 14 per cent., the South's farm investment of $3,951,531,632 yielded 25 per cent.

"The percentage of production to farm capital invested by states was as follows:

States.	Per cent.
Mississippi	42
Alabama	41.4
Georgia	34.6
Arkansas	34.5
South Carolina	33.8
North Carolina	29.6
Louisiana	27.3
Tennessee	24
Florida	23.9
Texas	20.4
Kentucky	20
Virginia	19.1
West Virginia	16.7
Maine	19.3
Vermont	16.9
North Dakota	17.5
Kansas	17.3
South Dakota	15.8
Nebraska	15.6
Ohio	15.3
New Hampshire	15.3
Connecticut	15

Rhode Island	14.8
Indiana	14.7
Missouri	14.6
New York	14
Massachusetts	13.7
New Jersey	13.7
Iowa	13.4
Pennsylvania	12.3
Illinois	12

"These figures show a remarkable high average for the South as compared with other sections, and indicate that in proportion to capital invested in agriculture the returns are greater in this section than elsewhere."

The Future of the Agricultural College

This world and everything in it seemed to be created and fixed according to some natural order. Things are not created by accident, but they come about as the working together, or the result of known or unknown facts. As we delve to the botton of things more and more of these forces are placed upon the side of the known. It also becomes more obvious that these forces work in harmony with one another according to a natural plan. The more a farmer knows of the working of these natural forces and of the methods formating the helpful and holding in check the harmful, the greater will be the pelasure and profit he derives from his work. It is the part of an agricultural college to give just such knowledge to the farmers of the state and those who may become farmers as years go by. The progress made by the school of agriculture within the past five years has been limited by insufficient funds, meager laboratory, farm equipment, and stock. It has been impossible to demonstrate and make clear the facts and principles brought out by instructors. This progress, however great it has been, is only a sign board pointing toward the achievements which our greater college may reasonably attain. Our two teachers have given all the instruction in agriculture, animal husbandry, and horticulture to more than fifty students each year for the past three years, in addition to managing and directing the work on the farm, in the barn and dairy, in orchard, and in the horticultural grounds. If two men working with our limited equipment accomplish the work of the past three years, what may be expected from the greater funds now provided by the state? When these funds are at the disposal of fully one dozen teachers, each an expert in his particular line of work? It is reasonable to suppose that when our magnificent new agricultural building, the plans of which are now drawn up, is ready for occupancy, the number of students taking agricultural work will be increased many fold. The new equipment for laboratory work, the improved machinery for actual field demonstrations, the enlarged dairy and live stock department, with new barns and improved pastures, the greater acreage devoted to horticulture and trucking purposes, will all combine to make instruction more attractive, pleasing, and profitable to the student. The greater number of teachers, which are sure to come, will enable each one to confine himself to a comparative narrow range of subjects, and thus come in closer contact with the student.

We have been informed that according to a United States agricultural expert, the state of Georgia has a smaller per cent. of really poor farmers and a higher per cent. of really good farmers than any other state in the South. It is further stated that this is due lagely to the fact that many of the better educated men of our state take a direct interest in agriculture, and that a considerable number of these men have been unconsciously influenced by the department of agriculture in the State University. If the influence of this department has done so much for the state where it has been so poorly supported, is it not fair and reasonable to claim that with the greater support now coming to our school, farming will soon be placed on a much higher plain, in fact, we believe this school as it promises to be developed within a period of five years, will place Georgia agriculture in a position far in advance of the agriculture of any other state in the Union.

The training of efficient farm laborers would be a worthy object in an educational intsitution, especially is this true if the school would take our untrained poor white boys who had a prospect of becoming able to earn one dollar a day by their own physical effort, and by giving them proper instruction would be increased in efficiency to such an extent that they would earn one dollar and a half to two dollars a day. Their value to the community in particular, and the State in general, would thus be increased. While as heretofore stated this would be a worthy object and one which should be looked after by the State University College of Agriculture.

There are others which are far greater in importance. The College of Agriculture should strive to train and educate agricultural thinkers and leaders. It should and will train men to use their brain to direct the muscle of less favored individuals, who from the very force of circumstances, will be compelled to occupy the position of farm laborer. The training of leaders who will take this unskilled labor and by giving it direction and supervision will add to its efficiency to such a degree as to enable it to command greater compensation. To do this he must be trained to think, to see the effect and to reason or discover the causes and then control them. A knowledge of agricultural science, thus becomes desirable. It will be the part of the agricultural college too give just such practical training.

There are three important reasons why every farmer should know something about laboratory work and how to handle laboratory instruments. First, for vegetation of any kind to yield the best products the seeds from which they are produced must be of the best. A thorough test of seeds cannot be obtained unless one knows something at least of the laboratory methods.

Second, at the present time when so many insects are infesting every part of our country, we canot possibly hope to do very much towards checking them, when probably only one person to every five hundred is able to take the insect, examine, and classify it. Until the average farmer is able to do something of this work, such things as the San Joe scale, the potato beetle and numerous other insects will continue to destroy our crops.

Third, the physical properties of any soil virtually determine the class of crops to which it is best suited. It is not an easy matter for the average farmer to study the physical make up of his soil, unless aided by some experience which requires simple apparatus. In order that the coming generation may be equal to this emergency, they must have training in a soil laboratory where they will take samples of soils from various sections of the State, and of various formations, place them side by side, compare their appearance, texture, and other physical qualities, determine their relationship to plant and animal life, their reaction to heat, moisture, light, and organic forces, then take sufficient quantities of these soils, place them in the greenhouse, plant various crops on them and observe the resultant growth, and thus by actual observation learn which soils are better adapted to grain and grass, which ones to cotton, which ones to truckage and garden crops, and which ones to fruits. Laboratory methods should teach the man to carry this work further, it should show him by actual experiment what use will be made of the various fertilizers and soil amendments under different conditions and for different crops. This knowledge is easily obtained and when once in possesion of the average farmer of the State, will enable him to use his soil to the best advantage, thereby reducing the cost of tillage and increasing the crop therefrom. We have mentioned two or three instancs in which a knowledge of laboratory methods and results would better equip the farmer for his life work. Many other cases could be cited. Those already given show the importance of the work.

The college farm is destined to play an important part in agricultural education, in fact the farm should be regarded in the light of a laboratory, wherein the principles set forth in the class room are fully and thoroughly demonstrated. The farm now at the disposal of the college of agriculture, is conveniently located, within easy reach of students and the public in general, and is of sufficient size, containing as it does, nearly eight hundred acres to afford unlimited facilities for demonstration work.

There is as great a variety of soil on this body of land as can be found on any similar area of the State. The south end has a considerable amount of light, sandy, and gray soil, toward the north the soil is tenacious, strong red clay formation. Between these two types occur the various grades of clay, loams, upland and lowland soil for which this section of the South is noted. Thus it is plain that the agricultural college in its farm has natural laboratory equipment, possessed by but few institutions in the United States. In this farm laboratory there will be space devoted to horticulture, to grain, cotton, forage, plants, live stock, and dairying. When this farm is developed as it doubtless will be, practically every crop growing in the State of Georgia will be given place, methods of plowing and harrowing, fertilizing, planting and harvesting, and marketing the various crops will be shown, methods of drainage and terracing will be illustrated practically, demonstrations of the use of improved farm machinery will be given daily. With the various crops, different classes of live stock, the up to date building and equipment, the farm will illustrate improved agriculture.

In addition to the regular one year and four year courses which we have now, it is hoped that when the new college of agriculture is completed, there will be added some special short courses for the farmer who has only a few months to spare at a time. For instance, in the fall have a period of two weeks devoted to this work, then in January perhaps a period of four weeks, as the farmer is not very busy at this time. It is reasonable to suppose this would be beneficial to the farmer. He could thus obtain instruction in any particular line of work in which he is interested.

After all that we have said, the agricultural college would be a failure if it does not attract students. We may judge of what the attendance will be only by looking to some Universities in which the special agricultural development began ten or twelve years ago. Ohio, Illinois, Wisconsin, and Cornell each count their agricultural students by the hundreds. The need of and the thirst for agricultural institutions is no greater in those states than in ours. Are we not justified in expressing a belief that within the next ten years the University of Georgia will have from five hundred to one thousand agricultural students? That most of these young men will stay only one or two years, at the expiration of which time they will go back to their respective farms and shed forth a light which will make easier and smoother the paths traveled by thousands of farmers, some older and some younger, who have through the force of circumstances been denied the privilege of an agricultural education. There are more that two hundred and twenty-five thousand farms in the State of Georgia. It is safe to say at least one out of twenty-five of these farms change owners or managers each year. The old man retires and the young one is called upon to assume control, then it is apparent that fully nine thousand men enter upon actual new agricultural work each year. This is the material from which our agricultural college has to draw and through this material age and experience matures it, will the influence be spread to make a greater Georgia agriculture.

TROY G. CHASTAIN.

The World and Cotton Growing

The world's demand for cotton is very great at present, and is steadily and rapidly increasing. Many spindles are being placed in use every day. Cotton is replacing other fibres for clothing and many other purposes at present. More than half of the population of the world wear no clothing, but this custom is rapidly changing. So it is evident that the demand for cotton will increase at a rapid pace for many years. There seems to be no immediate danger of over production. The United States Department of Agriculture estimates that it would require a 42,000,000 bale crop to clothe and otherwise supply the needs of the 1,500,000,000 of people who at present inhabit the world. It is certain that the world must raise more cotton. But where will it come from? Can the world raise enough of the great staple to supply his enormous demand?

In studying these questions we must remember the strict limitations placed on cotton growing by the peculiar nature of the plant. It cannot be grown profitably north of 37° N. latitude, or south of 37° S. latitude; nor does it do well in the tropics. So the profitable growth of cotton is strictly confined to the warm temperate zones. Many other conditions must be fulfilled. The cotton plant requires a long growing season during which the weather must be warm; it must have sunshine, especially while maturing, and an even though not heavy distribution of moisture ,especially during the growing season, but very little if any, moisture is needed during the opening season.

The South has always produced most of the cotton used by the world, but many attempts have been made by other countries to free themselves from the South's great monopoly. Most of these attempts to grow cotton have almost completely failed. At times it has been feared that the South would lose her supremacy, but after England, Germany, and more than a score of other great countries have spent hundreds of millions of dollars trying to find some place to produce cotton in order that they might be more independent of America, these attempts have signally failed. The South is yet supreme. These costly experiments have produced but little cotton and it is of an inferior quality, generally. The South now produces more than 12,000,000 bales annually while the rest of the world combined cannot produce 3,000,000. In other words, we produce more than four-fifths of the world's supply of cotton. And too we must remember that the farmers of other countries have every encouragement, including generous subsidies, to grow more cotton, while the Southern farmer has to be persuaded to grow less cotton, so that more than the mills can work up may not be produced. What could the South do if she had a guarantee of a good price for all the cotton she could grow?

If it is necessary to give evidence to prove further the South is supreme in this line, I will only give the evidence of one of the highest authorities that has been attempting to grow cotton in other countries than America. The Commissioners sent out by the British Government to investigate the cotton growing possibilities of the English colonies says: "All efforts to raise cotton elsewhere than in the Southern part of the Uinted States have failed. This is the home of the cotton plant, and if it will grow and fruit elsewhere to the extent that the staple has a substantial commercial value, the fact is yet to be demonstrated. It was experimented with under different suns during and after the American civil war, and all the experiments failed. Providence has given the Southern farmer a monopoly of the indispensable cotton crop, and he need not take fright when the price soars and there are heard threats of turning Africa, Egypt or other countries into cotton fields and making them furnish the world's supply."

The South's absolute monopoly on cotton growing may not be best for us. It has been said that competition is the life of trade, and probably this is true of cotton growing. If there were more competition in the present indifferent and wasteful methods of culture, cotton would be improved upon. More care would be used in the selection of seed, the soil would be prepared better; scientific cotton growing would certainly take the place of the present "haphazard" methods in use in the South.

Can the South produce the 25,000,000 bales annually that it is estimated the world will soon need? Look at the conditions. At present only one-seventeenth of the entire area of the cotton belt is actually planted in cotton. Suppose the cotton grower plants only one-fourth of his land in cotton. After allowing for towns and highways one-seventeenth of the total area of the cotton belt—an area equivalent to the total now planted in cotton. In this way the land given to cotton would be increased four fold. And further: it takes at present three acres to make a bale, while experiments clearly prove that it would be more profitable to grow a bale to every acre, by better cultivation and fertilization, thus increasing the yield per acre three fold. So we may correctly draw this conclusion: in the Southern cotton belt set aside an area, equivalent to that at present planted in cotton, for towns and highways; plant only one-fourth of the remainder in cotton, and our present acreage will have been increased four fold; now by reasonable and profitable methods of culture the yield per acre may be multiplied by three; now multiply the increase in acreage by the increase in yield per acre and the result is twelve. Now multiply the number of bales of our present crop by this twelve fold increase and you have the great total of more than 150,000,000 bales. Think of this enormous total amount! No one can reasonably doubt the South's ability to produce all the cotton needed for many years to come.

In closing let me borrow a paragraph from a writer who can pay tribute to our great staple crop in a much better way than I can do, though I appreciate its great importance as much as any one can do. This writer says of the great Southern industry: "It is indeed a rich heritage that we have a monopoly of the American export crop, which not only surpasses any other in value, but is worth more than all others combined; a monopoly of the one great crop of the world for which Nature has provided no substitute; the basis of commerce whose influence is measured only by the rising tide of enlightenment and whose condition is the thermometer of civilization; the crop which, when properly handled, is of all our crops the one least exhaustive of the land's fertilty, and which yields a seed that would in itself make cotton worth cultivating if it had no Fleece of Gold to keep its tens of thousands of modern Argonants upon our every sea; yielding the richest of cattle feeds, it will yet dot the hills and valleys of the South with a million flocks and herds, and so restore our famished old fields to virgin richness and beauty; our manufacture of cotton, now only begun, will also grow in the Piedmont South until the hum of our spindles shall be heard as far as the sea of England herself; and the Panama Canal will soon for the first time open full wide the doors of the Orient to our commerce, and Southern industry will throb afresh, as if new blood had been poured into its veins. Then, indeed, shall we have a section sunny in climate, in people, in prospects; we shall add to the chivalry and courage of the Old South the progress and prosperity of the new—and in the coming literary awakening, some more gifted author will at last write the real Epic of the Cotton, and in American letters the South's own snowy fields will become as famous as New England's gifted sons and daughters have made the ice fields of the colder North."

R. L. NIXON.

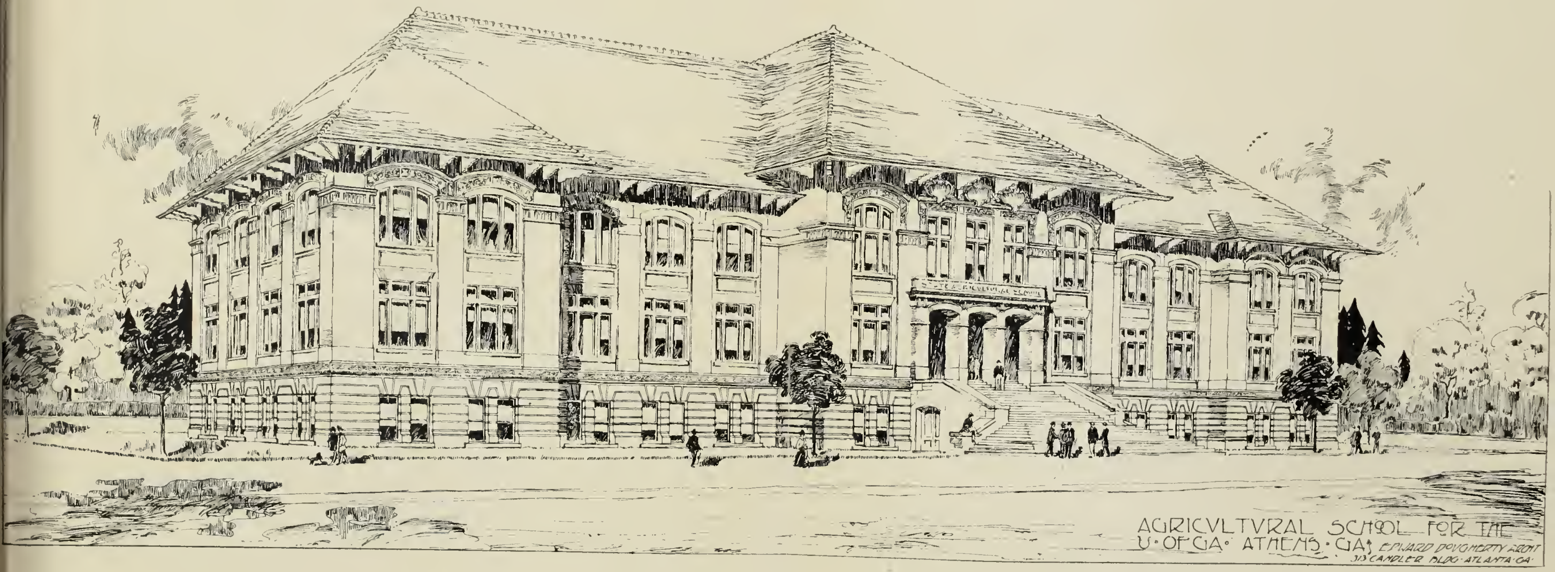
Intensive Farming

With the increasing growth of our cities and the accumulation of great numbers of people in comparatively small areas, with the extension of railroads, telephones and telegraph systems, rural free delivery, and trolley lines, there will be an incrasing demand for many agricultural products, which must of necessity be grown by intensive methods; that is, such products will be of a more or less perishable nature, and for this reason they will have to be grown comparatively close to where they are consumed. This of course does not affect the farmer who is several miles from a small market, but we give it as an example of the spread of truck-farming and by it show that the "intensive" method will apply to the rural farmer as well as those situated near cities. Indeed this system has been growing in practice very fast for several decades and now we are beginning to use glass houses for this purpose in some places. This glass house system will not be practical for general farming but is given to show the interest in "Intensive Farming."

Nearly all of the best arable land of the country has been taken up, and those who are most vitally concerned with soil production realize that henceforth the main problem for the man who intends to make cultivation of the soil his occupation will be not so much a question of greater acreage as of greater production from a given acre. The more valuable the land the greater the need for economizing every foot of it, and the greater the need for thorough knowledge of all the facts governing plant growth.

The usual aim of the farmer is to produce the largest quantities of salable products with the least amount of labor and invested capital. In many cases, especially in opening up new countries, extensive methods were probably the most profitable at the outset. In extensive farming nature is depended upon to do the greater part; man does comparatively little. In intensive methods the opposite is attempted: nature is assisted in every possible way and encouraged to do her utmost, the aim being the production of the largest quantities and, in trucking, of the finest qualities per acre.

There is a good lesson to be learned from the story of the Pennsylvania farmer with a 400-acre farm, who, after selling of 100 acres, found that by giving better attention to the remaining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300 acres, his sales in no wise diminished; later, after selling 200 acres more and controlling all his energies on his remaining 100-acre farm, he made it produce as much as the original 400 acres.

While poor soils are a great obstacle to profitable farming on the extensive methods, where the land is plowed, harrowed, and planted, and depended upon to produce the crop without high culture and without manures, yet with intensive farming so many things are done for the soil and for the plants that the original fertility of the soil is not so important a factor. Good soils are, of course, a great advantage.

We all read, with astonishment, the reports made by some successful truck farmers. Some report that on one acre of tomatoes the net income has reached the 200-dollar mark. Others have given as glowing accounts of strawberries, cabbage, etc. These examples give us the value of concentrating all our time, energy, fertilizers and work on a small area. Equally profitable are intensive methods when applied to dairying. We cite an example to show this. A farmer near one of our large cities had a mortgage of $7200 on a 15-acre farm. He began by manuring every acre of his farm, except the two on which his buildings were located, and putting them to grasses which were to be cut as forage. All this was fed to cattle and the manures put back upon the soil. The first year, on account of his extra expenses at beginning, he lacked $46 of paying expenses. The next six years found his farm free form the mortgage and its interest, and well stocked, and all from the proceeds gotten from the farm. Today he is keeping 30 head of cattle, 17 of which are milch cows, on the grasses grown on this 13-acre field. This is about three times as many as he would be able to keep were he to use any other method.

Now as to the intensive system in regard to cotton or corn culture, because this phase affects the greater part of our agricultural classes. We often hear it said that certain persons have more land in these crops than they can profitably handle. That is they could get more out of less area provided they employ all thier time, fertilizers, etc., upon the smaller areas. While the figures may not run hardly as high in cotton and corn as in the crops before mentioned, yet very large results may be gotten. By this intensive system as much as four bales per acre have been produced, and corn in the same proportion. Our ordinary farms will produce ½ bale at present per acre. If the same amount of fertilizers, the same amount of work be put on one-half the area, the returns will be about equal. Then the pleasure and ease of working a crop in order to further its growth, compared with the present metthod of working to kill grass and weeds which makes farm life and work sometimes very unpleasant, is no mean consideration in favor of intensive farming. JOHN K. GILES.

Fertilizers---Their Application and Use

W. Frank Dobbs—First Prize

1. Introduction.
2. The inadequacy of farm manures and the demand for special crops makes the use of artificial fertilizers necessary.
3. Fertilizer requirements of different soils and crops.
4. Fertilizing materials—their forms and functions.
5. Conclusion.

There is perhaps no question of greater importance to the farmer than that of soil fertility. To grow a profitable crop and at the same time to maintain or even increase the productive capacity of the soil, it is necessary to have a clear conception of the underlying principles governing the use of fertilizers and their functions in relation to soils and crops.

A study of the present conditions of farming in the United States shows that as a rule the manures produced on the farm are not sufficient to maintain its fertility and that the need of commercial supplies is a reality. Not only are the manures from the cities and farm not adequate to met the demands but their character and composition are not suitably adapted to meet the demands of plants. They are bulky, troublesome, and expensive to handle. Then the fertility elements contained in them are not in porportions to give the best results. Generally they are rich in nitrogen and poor in mineral elements. Also the elements contained in them are not in a sufficiently active form to produce a steady growth of the plant. In that case we would have to apply an excessive amount, which would result in a considerable loss of part of the elements and an abnormal growth of vine or stalk. Consequently for many crops it is profitable to supplement the natural manures by artificial fertilizers.

The growing of market garden crops and fruits has now become an important industry. But it has been found that the soils contain an insufficient amount of mineral elements to produce the best results. If we supply the proper food it not only causes the plant to produce a better quality and greater quantity of fruit, but in the case of orchards prolongs the living period of the trees.

It will, therefore, be seen that commercial fertilizers can be best used to reinforec farm manures. It should be the aim in aplying such fertilizers to supplement rather than to entirely replace farm manures for they can be best used on lands that are rich in organic matter, a material that can be kept in the soil only by the pplication of farm-yard manures.

Nitrogen, phosphoric acid and potash are the principle constituents to be applied to the soil for they are most quickly exhausted by the production and removal of crops. They are known as the "essential" fertilizing constituents, and the value of an artificial fertilizer is determined almost exclusively by the amount and form of these elements. It is not true, however, that all crops and soils will respond equally to fertilizers containing these elements for the needs of soils and the requirements of crops vary.

Soils differ as to their needs for a particular fertilizer owing either to their formation or to their management and cropping. A clayey soil is usually bountifully supplied with mineral elements while a sandy soil is usually deficient in the essential elements—nitrogen, phosphoric acid and potash. On the other hand a soil rich in vegetable matter is frequently lacking in mineral matter. Thus we see in a general way why it is that soils differ as to their need of the different fertilizing constituents.

Methods of cropping and management also exert an influence. Soils with equal natural fertility may not respond equally to regular methods of fertilizing because a single crop requiring proportionately larger amounts of one of the essential elements is produced several years in succession and it may be that the element most needed is in the soil in the last quantity. On the other hand, a crop may be grown that demands but minimum amounts of the essential elements and hence its application to the soil may be followed by good returns.

The leguminous class of plants which includes beans, peas, vetches and various clovers, differs from others in having the power to acquire their nitrogen from the air through the aid of organisms on the roots, and can, therefore, grow without the aid of soil nitrogen. On the other hand, the various grasses and grains are not only dependent entirely upon soil nitrogen but they must have an abundant supply during their period of growth to reach their greatest development. For the second class we see that it is very important to apply nitrogenous manures in order to obtain favorable results, while for the first class the plant can itself secure without expense to the farmer the needed elements. Thus we see that a knowledge of the variations in crops in respect to their power of acquiring food has a most important bearing upon the economical use of commercial fertilizers.

The form of a constituent means the combination or association it has with another constituent. The form, too, has an important bearing upon the usefullness to the plant. Materials containing the essential elements not in a form so that they can be used as food by the plant are practically worthless.

Nitrogen, the most expensive and perhaps the most useful one of the three essential fertilizer elemtns, exists in three distinct forms, viz., as organic matter, as ammonia, and as nitrate. Organic nitrogen exists in combination with other elements either animal or vegetable matter. In fact, nitrogen in this form is found in all plants and animals, and the value of various substances as sources of nitrogen depends upon the amount of it contained by them.

The value of materials containing organic nitrogen is in proportion to their rapidity of decay or change because decay must take place before the nitrogen can serve as food. With some materials the decay requires more time than with others.

The most abundant supplies of nitrogen occur in organic form. The most valuable sources from which we get organic-nitrogen are dried blood, dried meet, concentrated tankage, dried fish and cotton seed meal. These are all rich in nitrogen and decay rapidly when used under favorable conditions. The gradual change makes them particularly valuable for light open soils where the nitrate or ammonia nitrogen tends to disappear too quickly. Also the chemical change that takes place in the decaying of these materials helps to dissolve some of the mineral elements in the soil and thereby increase the amount of available lime, phosphoric acid and potash.

These products are valued chiefly for their nitrogen but they also furnish some phosphoric acid and potash. There are some other materials such as leather, wood, etc., from which we get nitrogen but they are so slow to decay that they are less desirable. When the object is to increase gradually the availability in the soil and not to get immediate returns they can be made useful.

As stated before nitrogen does not feed the plant in organic form it must decay. The first process of decay is ammonia; this exists in commercial fertilizer products as sulphate of ammonia, chlorid of ammonia, etc., and is more readily available than nitrogen in organic form.

Ammonia nitrogen is derived almost entirely from sulphate of ammonia which is one of the most concentrated materials that furnish nitrogen. This form of nitrogen is readily converted in the soil into nitrate. Before it however, is converted into nitrate it has the power of combining with other organic and material substances and in that condition can better resist the leaching action of rain. In periods of excessive rainfall this is a very economical source of nitrogen.

As we have seen before neither organic or ammonia compounds are directly available. They must be reduced to nitrate. This form existst in commercial products as nitrate of soda, nitrate of potash, etc. Like ammonia compounds it is very soluble and the nitrogen contained in it is readily available for the plant.

The chief sources of nitrate is nitrate of soda. This salt is very rich in nitrogen. It diffuses throughout the soil but unlike ammonia does not combine with other elements. It is therefore liable to be washed out of the soil if applied in too great quantities. Plants which get their nitrogen from the soil get it chiefly in the form of nitrate. Thus we see this is one of the most important sources of nitrogen.

From this discussion of the kinds and sources of nitrogenous fertilizers it is shown that the form of the fertilizer is an important factor in determining at what rate a plant may obtain the nitrogen. In the case of the nitrate, the form is such as to enable the plant to get all the nitrogen in one season. Also the extreme solubility makes it possible for some of it to reach all parts of the roots. The next substance in the order of availability is ammonia and the rapidity with which it will decay makes it almost as valuable as nitrate. The difference between these two depends greatly upon the season. In a wet season the nitrate is less useful in that it will be leached below the roots of the plant, while in a dry season it is more useful in that it can be absorbed more readily. The availability of the organic form as has already been pointed out depends upon the degree at which it decays. Therefore the point of prime importance to the farmer is to know how to use these forms to the best advantage.

The phosphoric acid in artificial fertilizers is derived from compounds called "phosphates" in which it may exist in combination with lime, iron, or aluminum. Phosphate of lime, however, is the form most largely used as a source of phosphoric acid.

Bone, in its various forms, is one of the principle sources from which we get phosphoric acid. It is applied to the soil without any change except that which is accomplished by mechanical action or grinding. Its fineness of division has an important bearing upon its rapidity of decay and its availability.

The mineral phosphates differ from the organic phosphates in that they contain no animal matter. The chief sources from which we get phosphates in the United States are the river and land phosphates of South Carolina, the "soft", "boulder", and "pebble" phosphates of Florida, the phosphate mines of Tennessee, and phosphatic slag, which is gotten from the manufacture of iron. None of these phosphates are used to any considerable extent without previous treatment with acid.

Superphosphates, or soluble phosphates, are derived from the insoluble materials already described by first grinding very finely and then mixing with sulfuric acid, by which method the phosphoric acid is changed from the insoluble to the soluble form. The phosphoric acid thus obtained is a definite chemical compound, the same in composition irrespective of the material from which it was derived. Therefore the term superphosphate is applied to any substance that has soluble phosphoric acid for its chief constituent. In superphosphates there is nearly always, besides the soluble, the reverted form which is, however, probably as useful. Superphosphates derived from bone-ash and bone-black differ from mineral phosphates in that they contain a higher per cent. of available phosphoric acid. The mineral superphosphates contain a considerable per cent. of the reverted form besides some of the insoluble.

The "double" superphosphates are a highly concentrated phosphatic material containing about one half times as much phosphoric as the superphosphates. They are made by dissolving phosphatic bone or rock in sulfuric acid which contains a high per cent. of free phosphoric acid. On a whole the superphosphates made from bone-black and bone-ash are more uniform in composition than those prepared from mineral phosphates. While on the other hand those made from animal bone vary greater than the mineral superphosphates.

The use of phosphoric acid should be governed by conditions of the soil, crop, and climate, as well as by its origin. It has been shown that soluble phosphoric acid, when applied to the soil, quickly unites with compounds of iron, lime or alumina. or enters into combination with certain organic substances; it is then said to be "fixed" which means that it passed from the soluble to the reverted or insoluble form. This power of phosphoric acid to readily unite with other materials in the soil is of great importance to the farmer for a great amount of phosphoric acid is thus prevented from escaping. In soils where lime is abundant, the soluble phosphoric is fixed largely as reverted lime phosphate, while in soils not well supplied with lime the phosphoric acid becomes fixed with compounds of lime and alumina. The difference in the method of fixation is of practical iimportance since the reverted lime phosphate may become readily available by decay while the iron and alumina phosphates become available much less readily. Sandy soil containing little humus does not retain soluble phosphoric acid well; and if they are very open and porous considerable losses may occur by the application of large quantities of superphosphate. Their retentive power, however, may be greatly increased by the application of animal manures or by liming or marling. On account of their open character, better returns are generally obtained from phosphoric slag or bone-meal. On the other hand, the best results are obtained from superphosphate when applied to heavy, fine-grained soils.

Potash may exist in various forms, though chiefly as chlorids, in which case the potash is combined with chlorin, or in muriates in which case the potash is combined with sulfuric acid. The form of potash differs from that of phosphoric acid and nitrogen in that it exerts little influence upon the availability of the constituent. All forms used in the fertilizer industry are soluble in water. These forms, however, have marked influence upon the quality of certain crops which is due to the constituent with which they are combined. This influence has been very distinctly observed in the growing of tobacco, sugar beets, and potatoes, where muriate of potash was used.

The chief sources of potash salts are the potash mines in north Germany. The products of these mines, which are now obtainable in this country, are kainit, sylvanit, muriate of potash, high grade sulphate of potash and double manure salts. The kanit and sylvanit are the crude products of the mines but they contain besides potash a number of other stalts. The potash in kanit produces an effect similar to that derived from the use of muriate since large quantities of chlorids are united with it. The sylvanit differs slightly from the kanit in containing a little higher per cent. of potash. The other potash products mentioned are manufactured from the crude forms and are much more concentrated. The muriate contains the highest per cent. of potash, usually about fifty per cent.

The best results are obtained from potassic fertilizers where applied to light, sandy soils or to humus soils. On sandy soils the best results can be obtained only when sufficient amount of lime are present. Without lime a considerable amount of potash may be leached out of open porous soils. On the other hand, heavy soils, or light soils containing lime hold tenaceously the potash which they receive. In light soils, the potash which is thus "fixed" is retained mostly near the surface although a considerable portion passes to and is held in the sub-soil. On soils rich in organic matter, such as reclaimed marshes or swamps, the application of potash is usually very profitable. It has been found, however, that the application of large quantities of kanit or other potash salts rich in chlorids to soils of this character injuriously affects crops. But, by the use of lime or sulphate, this can be remedied. Occasionally the application of potash gives good results on heavy soils which contain large quantities of potash but not in an available form. From certain crops like beets and potatoes excellent results are obtained by the use of available potash. It is best, however, in using potash salts under these two crops to apply them in the preceding fall or at least a few weeks before planting, otherwise the quality of the crops might be unfavorably affected.

Therefore we see how absolutely essential it is for the farmer in order to profitably use an artificial fertilizer and at the same time to gradually increase the productive capacity of the soil to know what the essential manurial constituents are, to know of the [illegible] of their chemical forms and the functions of each form.

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Wm. Warren Lang—Second Prize

Just what is necessary to make a fertile soil is not very well understood, but the crop production will very well serve as a measure of the fertility if the soil is under good conditions otherwise. So we may say that the purpose of the fertilizer is to increase the productiveness of the soil. The chief material used for this purpose is a chemical salt or some organic matter that contains a large per cent of the elements that are found in the composition of the plants, and these elements in a form that can be taken into the structure of the plant. Such materials are known in the market as commercial fertilizers, or, as sometimes called, Guanos.

The productiveness of the soil may be increased in three ways: (1) By applying the plant food to the soil so that the actual amount is increased; (2) By applying some material that will make the plant food in the soil soluble in water to a greater extent, so that the actual amount is not increased but the amount available to the plant is increased; and (3) By applying some material that will neutralize an objectionable toric or acid that has some physiological effect upon the plant.

The analysis of any of the most unproductive soils show that the elements of plant food are present in sufficient quantities or probably in too great quantities for the plant to be supplied if all of this was soluble in the soil water. It seems like poor business to apply as small a quantity as 50 or 100 pounds of nitrogen to the acre that already has several tons in the first foot of the soil. But it is just as if this large amount was not in the soil for the good the plant gets from it only in so far as it is soluble in water. There is a very small amount of the compounds of phosphorus nitrogen and potassium in the soil that are soluble in water so that avery small addition to this amount will make a marked effect upon the growth of the plant.

Fertilizers may be applied at any time of the season after the crop is up and growing, and indeed it is not advisable to apply them to the soil a long time before the crop is planted. There is considerable waste when the fertilizer is put in the soil early and the winter rains falling on it before the crop begins its growth. In some cases it is not advisable to apply all the fertilizer to wheat or oats in the fall when it is sown, but keep a part back to be applied in the spring after the heavy rains are over The fact that the plant can use the fertilizer immediately after it is put into the soil is of very great importance to the farmer. This eliminates the necessity for a long time investment Not only is this a saving of the use of capital but also it is a saving in the actual amount of plant food needed. A small amount may be applied with the planting and if it is found to be insufficient more can be supplied later; but if a large quantity had been applied all with the planting, probably a part of it would have leached out with the rain. Another advantage with a quick acting fertilizer is that the growth and developement of the plant can be watched closely and any part of the fertilizer that the crop will show is lacking may be supplied and the crop saved. Also it is unnecessary to plan out a system of soil manuring a long time before the soil will become productive.

Another very important point is the matter of controlling the proportions of the different elements of plant food. In a farm manure there is no control of this proportion, and even in the soil the fertility is usually unbalanced. So it means a great deal to the farmer to be able to balance out the natural fertility of his soil and also the farm manures. To illustrate just what is meant by a balanced fertilizer let us take an example. For instance we want to apply 400 lbs. of some fertilizer to a soil in ordinary condition. We say that a 9-3-3 goods gives best results for cotton: that is of this 400 lbs. there must be 9%, 3%, and 3% of phosphoric acid, nitrogen, and potash respectively. So we would get 36 lbs. of phosphoric acid, 12 lbs. each of nitrogen and potash out of the 400 lbs. that we applied. Now if we had applied only the nitrogen and potash the plant could not have used any of the application except just so much as it would take to use up the phosphoric acid of the soil and in the definite proportion that the cotton plant requires, which we agreed was 9-3-3. So if the soil has not any excess of phosphoric acid to begin with the nitrogen and potash is wasted. This shows that it is not enough to apply a fertilizer containing these three ingredients of plant food but they must be applied in the proper proportions if the best results are obtained It is not good practice and indeed it is impossible to get the plant to use up all the plant food applied, but it is some times advisable to "run short" on the more expensive element. In fact this is what the farmer usually does. The nitrogen, which is more costly and more easily leached out by heavy rains, he should apply just enough so that there will be very little left over, but he should apply an excess of the phosphoric acid and potash as they do not waste very much if any is left from the drain of the first crop. These proportions can be controlled only by the commercial fertilizer which may be made to suit any possible conditions. Such a fertilizer could not only afford a balanced fertilizer, but also make it possible to use the home manures to more advantage.

The material which is of most importance in building up the soil is vegetable matter in any form that will rapidly decay, leaving humus and liberating a small amount of plant food. The breaking down of this vegetable matter in the soil produces some chemical action, and this action causes the soil to break down also giving up its plant food. The composition of the plant which is used to furnish this vegetable matter is worth considering, as it will go back to the soil, but the most important point is that of being supplied with least cost. Clearly it would be cheaper to grow some crop that would leave a large amount of litter on the land rather than try to transport the litter from another place.

Decidedly the cow-pea is the plant that is adapted to supply both humus and plant food better than any other plant that can be grown in the South. This plant will supply the humus as cheaply and in better form than any other plant, and besides it will furnish an abundant supply of plant food, and, too, the most expensive plant food needed which is nitrogen. The farmer pays on the market three times as much for each pound of nitrogen as he does for 1 pound either of potash or phosphoric acid. So it is evident that cow-peas should be grown largely on the soils deficient in nitrogen as they produce a profitable crop of hay besides the value they are in making the soil fertile. But though peas seem to grow about as well on a poor soil in nitrogen as one rich in it, yet they must have an ample supply of potash and phosphoric acid. Prof. J. S. Newman, of South Carolina experiment station says in one of his bulletins: "By sowing peas upon the land—starting them off with a small application of nitrogen and re-enforcing the mineral plant food of the soil with potash and phosphoric acid to enable the peas to entertain as guests the nitrogen-collecting microbes, we are able to organize into one crop of peas.

grown upon an acre, as much nitrogen as thirteen tons of stable manure would supply, or more than three-fourths of a ton of cotton seed meal would furnish." I can say nothing more than this as to the advisability of growing peas, but it must be bourn in mind that without a very liberal supply of potash and phosphoric acid the peas will not make profitable returns. This fertilizer without the nitrogen cannot be produced on the farm and so again we find we are dependant upon the comemrcial fertilizer for making the soil productive in the most economical way. The same principal holds whether the cow-pea or any other plant is used to furnish the humus: it is more advisable to fertilize the land and grow the plant where the humus is needed.

Now let us consider the physiological question, and I give as authority for most that I shall say on this subject, Mr. Milton Whitney, chief of the bueau of soils in the U. S. Department of Agriculture. We know that some soils are poisonous to plant life. The alkali lands are of this nature. But this condition unfavorable to plant growth is thought to be caused by excretia that is thrown off by the plant. Plants, like animals, throw off excretia which must be disposed of. This is seen where cultures of bacteria are studied. If the bacteria are allowed to grow long enough they will kill themselves with their own products. Sometimes a soil will not produce when we know that it is not for lack of plant food, so it is safe to say that soils do contain poisnous material. Prof. Whitney says that this material is an excretia thrown off by a growing plant. This seems plausible, so let us take it for a fact that this is the way the poison is left in the soil; anyway we must find some means of removing this, no matter from what source it came.

Again the question of humus is important. This toxic is an organic material and is probibly soluble in the soil moisture, but as the water percolates through the fine soil particles this substance is taken up by the soil while the water passes through. Now the humus of the soil acts very much as a sponge and when present in the soil it removes this toxic so far as the growing plant is concerned. The toxic is either removed or changed so as to become unharmful to the next crop. It is proboble that some is changed chemically. Prof. Whitney says: "There is no doubt that fertilizers do act as plant food in many cases ,that stable manure and green crops, through the salts they contain, may act as plant food, but we have proof that a large part of the favorable action of cowpeas and of manure is due to the organic matter tself and the changes it causes in the soil."

This neutralizing effect is very well understood and is used often on a soil that is sour, as we say, by an application of lime.

The lime acts on the nitric acid, correcting the acidity and also making the nitrogen available to the immediate use of the plant. Prof. Whitney says that all fertilizers have this effect more than we have thought. He says: "These substances are all more or less easily changed, easily broken down, easily destroyed, and it is our belief that fertilizer applications in many cases act in much the same way that manure and cowpeas do in changing these toxic substances, namely, in affecting them in some way so as to purify the soil. Many of these substances we use as fertilizers have the peculiar power that nitrates have of readily acting on organic substances. You know how soon a jute bag rots in which you have acid phosphate or kainit or nitrate of soda if it is stored where there is the least amount of moisture; just so, apparently, these small amounts of fertilizers we add to the soil have thier effect upon these toxic substances and render the soil sweet and more healthful for growing plants. They are in a great many cases a ready means of purifying the soil."

Investigation shows that the same thing does not act in the same way on every soil in removing these poisonous substances. One soil is reported which was rendered less productive by an application of stable manure and others that were not benefitted by any fertilizer. So there has been no method found that will remedy every soil, but a frequent rotation of the crop system is found to be advisable, as what is poison to one plant may not be at all harmful to a different plant. A large amount of vegetable matter is of advantage and some fertilizer that will hsten the decy of this into humus.

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R. L. Nixon—Third Prize

Agriculture is the principal support of the South and America. If one crop of cotton alone should be a total failure America would be bankrupted and famine would sweep the land. With such an important agriculture we should be sure that we do not destroy it. Soil fertility is being decreased by many farmers. This is done in two ways: (1) by removing the elements from the soil that furnish plant food in the crops that we harvest, and (2) by poor management. The last way of injuring the soil is often much worse than the first, for many farmers allow some of their best soil to wash away every time it rains and much of the fertility leaches out on account of bad physical condition. By growing one crop, as cotton from year to year the soil is impoverished by losing the same element all the time. Then if we would continue to make our large crops we must replace this great loss of soil in some way. The use of commerical fertlizers is the most general way of supplementing the plant food of the soil. As agriculture is our "Staff of life" and the fertility of the soil is the foundation of agriculture, and soil fertility depends upon the use of commercial fertilizers, in our system of farming, it is well for us to study fertilizers.

Having seen the importance of studying fertilizers, we should next learn what is meant by this term "Commercial fertilizers." A study of the soil shows that it has an abundance of all the elements necessary for plant food, except three, phosphorus, nitrogen and potash. Commerical fertilizers contain these three substances. When we speak of fertilizers in general, we refer to anything that will improve the physical condition of the soil or supply plant food—anything that will increase the productivity of the soil. But commercial fertilizers are for supplying plant food only, and it ready for use.

More phosphorus is required on most crops and most soils than any other element. In order to be available for the use of plants phosphorus must be in the form of phosphoric acid and it must be soluble. Some phosphates are used, but this form can only be used slowly by the plant. An important question is the future source of phosphorus, for it is used so extensively that there is danger of exhausting the supply. Most of the phosphorus now used comes from two sources: (1) bones and (2) rock phosphates. The supply from bones is small and the phosphates are found in very few places.

There are two forms of nitrogen that may be readily used by plants: (1) ammonia and (2) nitrate. The nitrate is in the best form for immediate use, but the ammonia has to undergo some changes before the plants take it up. These changes take place very rapidly, so ammonia soon becomes available after being placed in the soil. The principal sources of nitrogen are (1) Nitrate of Soda, (2) cotton seed meal and (3) dried blood. In the first one nitrogen is ready for use, but in the second and third it is in the form of ammonia and must be changed before the plant can use it. Cotton seed meal also contains small amounts of other plant foods.

The element potassium is used by plants in the form of potash. There are only two sources of this substance, wood ashes and the mineral salts from the mines of Germany—Kainit and Muriate of Potash. The use of wood ashes is not nearly so extensive as it formerly was. The principal source of potash at present is Kainit and Muriate of Potash, both of which come from Germany.

I will summarize what I have said so that it may be kept clearly in mind:

1. The study of commercial fertilizers is very important because most farmers only return to the soil, as commercial fertilizers, that which they remove as crops and also that which they allow to wash away.

2. Three substances compose commercial fertilizers: (a) phosphoric acid; (b) nitrogen, or ammonia and (c) potash.

3. The principal source of these fertilizing constituents are: (a) phosphorus—bone meal and rock phosphates, (b) nitrogen—nitrates, cotton seed meal and dried blood, and (c) potash—wood ashes and the mineral salts, Kainit and Muriate of Potash.

When it comes to the use of fertilizers there are but few farmers who could give an intelligent explanation why fertilizers are used at all. Many use fertilizers without knowing why thew do it except it is done to make the crops grow. They buy what the dealer offers them without knowing anything more than that they are getting guano. There are, of course, many who have a fairly good idea about what kind of fertilizers should be used, but they know but little about why such a fertilizer will produce a desired result or the opposite. There are two purposes for which commercial fertilizers are used—to supply plant food and protect from disease.

Now what part does each of these fertilizing constitents contribute toward the growth and development of plants? This is certainly an important question and deserves more consideration from the farmer than it gets. Many purchase fertilizers that do them no good because, not knowing what they needed, they get the kind that the dealer offers them. After much study and investigation the best authorities on the subject found that each ingredient of the fertilizer had a definite function to perform in the growth and development of plants. Nitrogen increases the growth of the plant. If land does not produce large enough plants nitrogen should be used to make the plant grow larger. Phosphorus causes the plant to bloom more freely or take on more fruit, and potash helps to develop the fruit and also to fortify against diseases.

The purchase of fertilizers has an important bearing upon their use, for on proper judgment in buying often depends the success or failure of profitable use. Some prefer to purchase the ready mixed fertilizers but others buy the different ingredients and do their own mixing. There are arguments in favor of both plans. In favor of the first plan it may be said that, (1) the materials are mixed better than is usually done by hand, (2) it saves the trouble of mixing, and (3) it is often difficult to get the materials at reasonable prices for dealers do not like to sell materials for making fertilizers. They had rather sell the complete ready mixed fertilizers. In faver of home-mixing we may say: (1) that it is cheaper, (2) that we can make fertilizer in this way that contains just so much of each ingredient as we need. (3) the cost is not great for it can be done when farm hands could do nothing else. When everything is considered I think it would be cheaper and better to purchase the different materials and mix them at home. Perhaps the best plan would be for a number of farmers to form a club and purchase these fertilizing materials in considerable quantities. This would be cheaper and if everyone would make a careful study of conditions and needs of his own soils and crops he could make a fertilizer better suited to his own peculiar needs than he would by getting ready mixed guano. The cost of mixing would be much less than what would be saved and there would be so little difference in the way that they were mixed that it could not be considered against this plan.

Some people question the advisability of using fertilizers at all. They have not realized a profit from their use and believe the practice to be wrong. With proper soil management the necessity for fertilizers would be lessened, but with the common practice of raising so few stock as we now do and not properly manuring our crops the liberal amount of commercial fertilizers is very necessary for the best results. Those who have failed doubtless did not manage wisely. They did not use the fertilizer needed by the plant, or it was not properly applied, or the soil was not in proper condition. An intelligent use of commercial fertilizers will certainly pay handsomely on the average Southern farm.

While under the present conditions I think we could use twice or more than twice the amount of fertilizers we do use, we could do much to change the conditions so that so much fertilizer would not be necessary. In the first place more live stock should be kept; and to some extent the maure would take the place of commercial frtilizers. Abundant forage crops could be grown and fed to the stock. In this way much of the substance taken from the soil would be returned to it in the form of manure. And at the same time these leguminous forage crops would be collecting nitrogen from the air and storing it in the soil for other crops. Then by proper rotation some of all elements of plant food in the soil would be used but none of them would be exhausted. So by keeping more live stock, growing more leguminous forage crops and by properly rotating the crops we greatly alter the conditions that make the use of so much commercial fertilizer necessary.

While we may in many ways improve our soils without using commercial fertilizers, there is no doubt that an intelligent use of these commercial fertilizers is very profitable. But few farmers now use as much fertilizer as they should. It is a question with some how much to use, others never think. It is of course impossible to lay down any rules for the amount of fertilizers to be used. In the first place different crops require different amounts and different kinds of fertilizers. Different soils and also the condition of the soil greatly influence the amount that may be used profitably. Many men put most of their fertilizers on the poor land, and it not prepared well. This is a mistake, for careful experiments show that fertilizers pay better on good land that is well prepared. A poorly prepared soil is not the place to make a profit from the use of fertilizers.

Another important question is the amount of each ingredient to be used and again the crop to be grown and the composition and condition of the soil must largely determine the fertilizer to be used. An experiment shows that when a certain amount of the three ingredients were used so much cotton was produced but when only one of these materials was increased there was an actual falling off in the yield. This experiment shows conclusively that to get the best results we must have the proper proportions of each element in the fertilizer. To make the greatest success every farmer should conduct experiments to determine the kind and amount of fertilizer that will pay best under the conditions of his own farm. It is safe to say that most men use fertilizers too sparingly. . Poorly prepared soil cannot use much fertilizer, but if the soil is thoroughly prepared large amounts will pay handsomely.

When and how should fertilizers be applied? There are many woys of doing it, and I cannot say which is the most meritorious. But it may be said that nitrogen should not be put in the soil unless it is then needed for it will soon waste if not used. But phosphorus and potash become fixed in the soil, so they will not be lost if applied some time before they are needed. From this it seems we may apply phosphorus and potash for the use of the plant for the entire year at one time, but the nitrogen should be applied only as needed by the plant if waste is to be avoided. Experiments show that we get better results when the nitrogn is used in several applications. This is especially true of cotton.

We may make a few general statements about the use of fertilizers: (1) fertilizers pay well on cotton. (2) They did not pay so well on corn, especially in large quantities. (3) They are profitable as a top dressing for grass. (4) Wheat and oats should be fertilized if profit is expected. (5) Fertilizers pay in market gardening more than any other way. (6) Use more fertilizers on better prepared soils—do intensive farming—here lies the secret of success.

Let me emphasize the importance of the use of fertilizers.

If a study of the needs of the crops under your peculiar conditions be made with proper care then you can certainly make nice profit by using commercial fertilizers very freely. But do not make the mistake of using a fertilizer because somebody else used it. Find what you need and get the highest grade, for it is much cheaper than the low grade goods. If you buy low grade goods you pay extra freight and get an inferior article also. Use more fertilizers. I heard one former say that when two hundred pounds per acre were used it would take two acres to make one bale of cotton. He has now doubled the amount of fertilizer and gets one bale per acre. In this he has made a good prifit and improved his soil too. By the first method he failed; by the other he made a great success.

Perhaps in conclusion I may profitably summarize what I have tried to say:

(1) Commercial fertilizers are used for the food they furnish the growing crops. This food must be soluble and in such a form that the plants may readily use it. There are three essential constituents of commercial fertilizers—nitrogen, phosphoric acid and potash.

(2) With the soils in their present conditions a liberal use of commercial fertilizers is very necessary to make farming profitable.

(3) The value of a fertilizer is determined by the amount of available phosphoric acid, nitrogen and potash it contains.

(4) Fertilizers do not do as much good on poorly prepared soils as on those that are well prepared.

(5) Home-mixing is preferable to purchasing ready mixed guanos.

(6) The kind and amount of fertilizer used should be determined by the nature of the crop, the conditions of the soil and the method of cultivation.

(7) There should be some definite paln for the application of fertilizers. Haphazard methods should not be tolerated. Nitrogen should be applied as needed by the plant.

(8) More fertilizers should be used and what is used should be used more intelligently. Intensive farming rather than extensive shrould be the rule.

This paper is not claimed to be original in thought, but it contains the ideas brought out by the best authorities in the counthy. I have only tried to tell what others have found out about this very important question. This subject deserves our best thought. Just think of the enormous amount of commercial fertilizers Georgia uses every year; then you will realize its great importance. For many years to come the best and most successful farmers will use these fertilizers freely. The plant food furnished by the soil must be supplemented, and the man who is industrious enough to find the best way of doing this is a public benefactor, for in so doing he will render a great service to mankind.

The University Agricultural Club

This club was born on January 15, 1907. At the first regular meeting, out of a total of 50 agricultural students in college, 18 joined our ranks and since the membership has steadily increased until it numbers thirty at present.

This club is principally and educational organization. It is established to give the agricultural students an opportunity to discuss together those existing problems peculiar to their calling. It stands for progress, and being established just as the Department of Agriculture at the University is in a progressive way, it hopes to combine its force with that of the faculty of the University and the state at large, to make the Georgia Agricultural School the equal to any in this country.

The writer is a member of several different organizations, and he can state positively that the relative percentage of attendance is higher for the agricultural club than for any other similar club in college. He remembers distinctly that on a certain night a "musical," free to the public, was held on the campus. Every other club whose hour of meeting conflicted with that of the entertainment suspended exercises while the Agricultural Club met, 'tis true, earlier than usual and carried out the scheduled program. Though she be young, yet such manifestations of zeal on the parts of her members, as illustrated by the foregoing incident, bespeaks for the club a long life and a useful career.

The club conceived the idea of issuing an annual. Considering she is in her infancy and without means, this was a bold undertaking. The efforts have been rewarded accordingly, as the present volume deserves merit. The club has no apologies to offer her friends for the many defects of this issue, for she feels she has done her best under the circumstances—all any organization can do.

"He that by the plow would thrive,
Himself must either hold or drive."

The District Schools

J. L. ARRENDALE.

To become a distinguished and widely known lawyer, anyone must give a large amount of study to his books and much practice in the courts; to become a teacher with the ability to teach successfully anyone and everyone must devote much of his time in school both as student and as teacher; likewise, to become a farmer who can make a success at his work anyone must both study a great deal and do practice work, or experimental work on the farm.

In former years this has been generally the case so far as the teachers, lawyers, etc., are concerned, but not so with the farmer. The lawyer bought his books, went to school and studied his profession. Likewise, the teacher, preacher, etc., studied their profession. When they had finished their school days they went out into the world with the aid of a good education to their life work. But when the farmer went out into the world to reap the fruits that were to come his way, he did not have any education to tell him how he should do these things and therefore, had to do them by his own experience. He only had that strength which nature had kindly bestowed upon him to earn his living. With this and by the aid of a mule, plow, hoe, etc., the farmer went into the field and by hard toil he earned his living. The farmer never even thought of studying his work as the lawyer and the teacher did. What was the result of this? As it required very little manual labor to earn money as a teacher or lawyer, many people became teachers or lawyers and soon there were so many that there was a decrease in the demand. But few became farmers with the ability to farm successfully on a large scale, and as a result of this, there was a great demand for farmers who study farming and know how to farm successfully. There is still a great demand and will be for all time yet to come.

In order that we might have farmers who know how to farm scientifically and in order that men might be induced to study the important principles of farming and to take the experience of others rather than gain the knowledge by experience, the legislature of Georgia introduced and passed a bill providing that there should be erected and sustained an agricultural school in each congressional district of Georgia.

The act of the legislature is that these schools shall be established and maintained under the authority of the Governor and that they shall be branches of the State College of Agriculture at the University of Georgia and that the trustees of the University of Georgia shall exercise their judgment as to the securing of unity of plan and efficiency in the schools. That all fees of the Department of Agriculture of Georgia which are obtained by means of inspections and otherwise exceeding expenses of such inspections shall go to maintain the schools. The trustees are appointed by the governor, one from each county in the district and they shall control the management of the school and make rules and regulations for same. There shall be one principal of the school, one superintendent and instructor of farm work, one instructor of mechanics, one practical instructor in charge of the stock and darying, one English instructor, and assistants will be employed in proportion to the needs of the school. The course of study shall be on the elementary branches and shall prepare students to enter Freshman class at the State College of Agriculture at the University of Georgia upon certificate of the principal. After the buildings are complted and school is started, the work on the farm, in the dairy and about the school shall be done only by the students of the school.

These schools are ranked as the high schools of the state in their lines of study, and in addition to the work done by the hign schools, they carry a course in agricultural training. The curriculum of these schools contains a course requiring four years, the student gets a good training in English, History, Mathematics and to some extent in foreign languages besides his valuable training in Agriculture. The student's work in other studies than agriculture amounts to approximately 2,000 hours during these four years, while his class-room work and practical work in agriculture amounts to 3,173 hours during the four years, which gives a total of 5,173 hourse work in four years of school.

Contrast the agricultural work to be done in these schools with the agricultural work done in the District Schools of Alabama. In the District Schools of Alabama they have only two hours per week in agricultural training during the four years or a total of 320 hours of agricultural work done in four years of school. Does this not show within itself that the people of Georgia are aware of the fact that a training in the lines of agriculture is needed by every farmer? Does it not show that the people of Georgia see that more farmers who know how ta farm to the best advantage are needed? And have the people of Georgia not provided for this very wisely and will they not continue to provide for that which the whole world is dependent upon: the production of all farm products? It looks evident.

Besides the four years course in agriculture, mathematics, English, etc., given to the boys, there is a four years course given to the girls in Home Science, including the study of foods, cooking, dining room service, launderying, household emergencies, gardening, darying, hand and machine sewing, simple dressmaking, millinery, home ornamentation and household science. These will be studied and practiced at the three hours of practice periods, largely under the direction of a teacher of Domestic Science. As this course shows, there is enough work done in it to admit any of its girls into schools which have higher curricula and which carry a fuller course in Domestic Science. Therefore, not only the boys but also the girls of our State will have the advantage of our district schools. It is a well known fact that most schools for girls hold Domestic Science as one of its most important courses. There are some girls who can never obtain the training of a college course, though they may receive some instructions and training how to care for and perform the duties required around a home by having the advantage of this course of Domestic Science in the district schools.

The location of each of these schools in its district is of very great importance and the plan of selecting the location was a very good one. The plan was that the county of the district that offered the highest and most favorable bid should get the location of the school. As a result of this, there was a high spirit raised among the farmers as well as the principal educators and very liberal bids and donations were offered. The bids of all the districts of the state amount to nearly $850,000. The bids for the location of the schools will be used as a fund to erect the buildings and to furnish lights, water, etc., and the land donations will be used as the campus and the farm of the schools.

The purpose of these schools is to prepare boys who wish for the State College of Agriculture, to prepare boys who are unable to carry a college course, for the duties and requirements of a scientific and successful farmer, and to prepare boys to become Georgia's loyal citizens—to know what is required of a genuine, up-to-date citizen. It is not only to prepare the boys for the duties of life but by the course in Domestic Science it is to prepare the girls of our state for the duties that will fall upon them.

By the advantages which are offered so liberally by the legislature of Georgia and by the bidders for these schools, there should be within the space of a few years scores of young farmers going out from these schools with a clear knowledge of the principles of farming as taught by the experience of others. Young farmers with a determination to put to practice what they have been taught —what others have put to practice and have succeeded in. This being the case, it is quite evident that our state will be greatly helped in her agricultural productions. By the helping of her agricultural productions means that her financial condition will be bettered, for, as is well known, the finances of our state depend largely upon the agricultural productions of the cotton fields, peach and apple orchards, corn and hay crops, truck farming and other crops.

Besides these men who will go out from these schools as farmers, there will be a few boys who will have the ambition to take a course in agriculture at the University of Georgia and become prepared to go out and farm on a larger and more scientific scale. These boys might decide to go out and teach others along the line they had studied. This will be so much the better for they would still be helping the youths of our state along educational lines and they would be inducing the boys to become scientific and successful farmers, men with the capacity to do good to their state as well as to themselves.

The question that confronts us then is how are we going to get the best results out of these schools and make them the most important educational schools in the state? The legislature has started and is going to erect the buildings and maintain them, now it is up to the people of each district to help along the progress of these schools. Let every man get behiind them wth anything that will help along and push the schools along in their progressive growth until they come to the place where the people will delight to look at the district schools and feel proud of their beginning. All that is necessary for the best results of these schools is that there should be plenty of boys and girls to receive the benefit offered by the legislature. Let there be plenty of students in each school and most assuredly the schools will be a success.

It is useless to discuss the value of an education here for the value of an education is unquestionably well worth the time and money spent in acquiring it. The uneducated man recognizes that an education is of value to man because he looks at the educated man as a man who has been put on a higher plane because of his great powers which are given him by means of an education.

Look what educated men have done for our state—men who made our laws were educated men; men who taught in our schools were educated men; men who made themselves known by inventions were educated men, and all men who have become men of much importance have been educated men. Now, on the other hand, look at the uneducated man, he has made no laws, he has taught no schools, he has made no inventions, nor he has done anything only use that which nature has given him—strength.

Are our schools not for the purpose of making great men? If they are why not make them serve their purpose? Let every man get behind these schools and not only make the boys the great men of our state but also make the district schools the pride and glory of all the schools of our state.

The Position of Leguminous Crops in Agriculture

Voorhees calls the members of the legume family "nitrogen gatherers." They do not depend solely upon soil sources; but rather gather the element from outside, and thus do not reduce the amount of nitrogen already in the soil. The distinguishing features of the plants in this order are that the seeds are formed in a pod or legume (whence its name, from Lat. *legere*—to gather) and that they have the power of acquiring a large part of their nitrogen from the air. This gathering of nitrogen is accomplished through living microscopic organisms in the soil. If these organisms or bacteria be present, it will be shown by the growth of nodules, or little knots, upon the roots. It is believed that the nitrogen is obtained through these nodules, each one of which contains a bacterium. If the nodules do not form, it is an indication that the bacteria are not presentin the soil, when they must be introduced by inoculation. When the crop is plowed under, the nitrogen, stored in the roots and top of the plant, increases the soil content of this element and therefore adds to its crop-producing capacity.

It is a well known fact that nitrogen is an all-important element in crop production, and that the present available sources are rapidly nearing exhaustion. This unfortunate fact makes nitrogen the most expensive ingredient of our commercial fertilizers. For years the most important sources of this valuable element have been guano and saltpetre.

There are two kinds of saltpetre; common saltpetre or potassium nitrate ($KNO\ 3$) and Chilian saltpetre or nitrate of soda ($NaNO3$). Guano—Peruvian guano—has already ceased to be of any great importance and, at the present rate of consumption of saltpetre (estimated at one billion tons a year), it is certain that it cannot last for a very great length of time, some placing the limit at less than fifty years. "But," you say, "isn't there plenty of nitrogen in the atmosphere?" Certainly there is,—in fact 79%, or nearly 4-5 of the air is represented by this precious element. But how are we to make it available for the crop? Through a previous crop of legumes, which has taken some of this nitrogen out of the air and put it in the soil where the plant can get it. In this instance the legume is a partial remedy for the decrease in the present source of supply.

But again, various things—mainly the increasing scarcity—make the cost of the saltpetre almost prohibitive for the general farmer; while the legumes leave in the soil a valuable store of nitrogen, as well as yielding a removable forage crop, with only the cost of seed and labor. Careful experiments have been performed by the U. S. Department of Agriculture, the results all tending to prove that a leguminous crop affects the soil which bears it like the addition of a considerable amount of nitrogenous fertilizer. Averaging results in sixteen states, the amount of nitrogen added per acre has been computed as 122 lbs.; in Germany it is estimated at 200 lbs. per acre. When it is remembered that the highest grade of nitrate of soda contains only about 15% of nitrogen, it will be seen that a crop of nodule-bearing legumes is equal to from 800 to 1,000 pounds of nitrate of soda per acre, which, at the present rate for this fertilizer, represents a value of from $20 to $25.

As all legumes are deep rooting plants they aid greatly in loosening the subsoil, thus the damage from excesive rains or from drought is lessened. They also furnish a large amount of humus.

Legumes, for the most part, are easily raised and for our Southland there are several which do remarkably well. Hundreds of farmers are taking alvantage of their nitrogen storing abilities and are thereby enriching their land, beside raising enormous crops of forage. We are all acquainted with our Southern legumes, a few of which might be mentioned: the cow-pea, velvet bean, beggar weed, beans, ground-pea, soja bean, alfalfa, other clovers and the vetches. We can see what they are doing for our soils. Who can say that we shall soon be destitute of a nitrogen source?

FRED W. BALL.

Plan Work

IMPROVE THE FARM—DEVELOP THE STATE.

The modern or up-to-date business, whatever it may be, requires a well studied and arranged plan or set of plans along which it is operated. The very existance of our manufacturing industries demand system and plans. The merchant must have his work planned months and even years in advance. Transportation companies have plans laid for work which may not be fully completed within a period of a dozen years. System is absolutely essential to success to any of the above industries. The teacher must have his work planned for months and even years ahead. The preacher must plan his work, study his sermons for months in advance and weigh the probable effect each may have and then arrange them in such conservative order as to guarantee that each will help to strengthen those going before and make ready the hearer for the one to follow. All this is necessary to guard against loss of time, energy and efficiency. The lawyer should and does have plans along which he proceeds in preparing his case for trial and further he has plans of preceedure in examining witnesses and also in presenting his course to the court or jury. There is none so obtuse as to suppose for one moment that any of these men could render epually valuable and efficient service to mankind and the progress of civilization were they to throw aside plan and work in a haphazzard way. These men are all working under conditions more or less artificial, consequently the difficulty of controlling and modifying them need not, of necessity, be very great. In fact such work might be conducted in accord with plans just recently laid and which may be modified from day to day. However these plans are generally laid well in advance and then adhered to quite closely. In professional, industrial or commercial work plan and system become the price of success. Is the farmer's business so much simpler and easier mastered or so much more insignificant that one may follow it successfully in the absence of all plan, system or order? Let us weigh the farmer's problems for just a moment. Much of the simplicity with which they are commonly supposed to be clothed disappears or gives place to garb much more complex in nature. These questions of farm management; of crop production, of the care of animals, of feeding animals and plants to become more complicated as they are given serious thought. These are nature's own processes which work according to nature's plans laws and in her own systematic order. There is a fixed and knowable law by which soils have received and retained stores of plant food. There are also clear and knowable laws according to which these elements are set free to nourish plants, and thus promote growth or perchance if these laws are not known or understood the greater portion of the plant food rendered available may either escape from the soil or else be locked up in it again without having performed any useful part in plant or animal life. There are important lessons, yet to be learned, of the working nature's forces and how they may be controlled, modified or turned about to best promote man's interest. Conditions vary, consequently the results coming from any fixed practice may not be uniform one time with another. The better the work is planned the more nearly uniform the results to be expected.

Let us now turn to our main purpose in this paper. The average farm is not worked in accord with any fixed or carefully thought out set of plans. The object is rather to work just as much of the tillable land in the main money crop regardless of whether the soil and crop are adapted one to another or not. The cry in March, April or May is to "plant cotton" regardless of what the harvest may be or what price the year's crop may bring.

A farmer has one hundred acres of open land to tend. This land averages in productiveness with other lands in the South it will therefore produce under a favorable set of conditions forty bales of cotton. The crop, that is the lint and seed, will sell for twenty-five hundred dollars. It will cost from fifteen hundred to eighteen hundred dollars to make and put the crop on the market. There is then left seven hundred to one thousand dollars from which the farmer draws his salary as manager, pays tax on his farm and equipment, makes good other slight losses; after which the remainder, if there is any remainder, is counted as profit. After this land has been farmed five years in succession it fails to yield the forty bales, as previously counted upon, thus the returns begin to grow smaller and smaller until finally the profits disappear, next the farmer's salary is not paid, the crop is then made at an actual loss. The farm or portions of it may now be thrown out for a few years to rest or recuperate.

Go back a few years please; make a careful survey of this one hundred acres of land when it was producing the forty bales of cotton, in all probabiliy we find twenty to thirty acres producing proportionately much better than the average, while thirty to forty give yields in keeping with the average for the place while the remaining thirty or more acres produce away below the average. There is a very satisfactory profit coming from cultivating the better lands. There is a small profit coming from the acres of only average productiveness, while the poorer lands are worked at an actual loss. It costs as much and in many cases more to cultivate an acre of poor soil than one of a higher degree of prductiveness.

So far as the actual profits from the years work is concerned they would have been better if cotton had not touched the poorer lands. Those lands should have been set aside for crops of a lower labor cost and of a high soil improving efficiency. These crops should make forage and foods to support the teams and labor while engaged in making the cotton on the better lands, thus the cash cost of the crop is reduced which is equivalent to increasing the profits from the years work.

If a reasonable profit is to be gained from farming the lands of low productivity must either be used in the growth of crops which require a minimum of labor and which have a tendency to build up the soil, or they must be withdrawn from cultivation entirely. Those of only moderate productiveness must be devoted to crops the making of which costs only moderate sums, and at the same time will improve or increase the productiveness or fertility of the land. Such crops are usually of a comparatively low commercial but of a rather high feeding and fertilizing value. Consequently they should be used at home to sustain work stock and grow other animals and feed dairy cows the products of which are readily converted into cash while the manures made may and should be put back on the land. The lands of higher production calls for a maximum of labor and skill. These crops usually have relatively high commercial value while the actual amounts of plant foods they remove from the soil may not be very great, yet as they make their growth only under favorable conditions they must be stimulated by good soil and intensive cultivation. These crops should be marketed rather than utilized as foods on the farm The farmer should ever bear in mind the importance of good soil to cultivate. He should strive to improve the texture of his soil and increase its store of plant food from year to year. A poor farmer soon wears out and impoverishes a good soil. He does this by working contrary to nature. He fails in his observations. He fails to interpret facts and principles which are recorded on the pages of nature and laid open for his perusal day by day. A good farmer generally has a good soil. If nature favors him with a fairly produstive piece of land when he is starting out in life he makes it better and more productive with each succeeding cycle of crop rotation. He drains it, he plows it, he pulverizes it, fertilizes and cultivates grows good crops and yet the soil seems to get richer and richer under his care. If he comes in possession of a poor or run down farm the good farmer goes about making it over again. He cannot afford to spend his time and energy in growing poor crops for the market. First, the soil must be built up; afterwards the paying crops will come.

Land capable of growing two hundred pounds of lint cotton per acre finds ready buyers at twenty dollars. The profits from three or four crops pays for the land. This same land at a cash cost of five to ten dollars per acre and a year's time may be put in condition to grow three hundred pounds of lint. The cost of cultivation is no greater with this than with the smaller crops, while the profits are fully three times as great. The building up of the soil thus becomes one of the most profitable pieces of work.

Any country to be prosperous agriculturally, must have good soils, climate suitable to producing valuable crops, and a good class of farmers to look after the soil and utilize to advantage those qualities constituting good climate.

These farms must be self-sustaining; they must not wear out but on the other hand they should improve under cultivation. The good farmer will help his farm and make it help him. He will rotate crops; plow and fertilize his soil thoroughly, fertilize rationally, plant good seed, cultivate freely and harvest abundantly of diversified crops. He will have his own wood-lot, pasture fields and grass or hay lands. The grounds about the house and buildings will be ample in area and well laid out. The lots, yards, garden roads, etc., will be utilized to their fullest capacity for the purpose designed. Machinery, implements and stock will be kept in good condition, always ready for service and in sufficient quantity to work the place to the best advantage.

According to the United States census of 1900 our state (Georgia) had 224,691 farmers; of which 141,865 containing an area of 20,917,083 acres, or an average of 147.4 acres to the farm.

It is our purpose now to take one of these average farms, divide it up into different areas or fields, allot each to its particular purpose, then outline a system of management according to which it may be operated to advantage.

It is advisable to provide for a wood and timber supply. Pasture and hay lands, for yard, lots, orchard, garden, roads, etc. Land for cotton, for corn, for small grain and peas or other leguminous and general forage crops. We have 147.4 acres at our disposal. To insure the annual supply of fuel and some posts and other light timbers as the needs of the farm may demand let us set aside about twenty-five acres which we shall know as the wood lot. Better results will be received by devoting this to the production of wood and timber as planned and not as a pasture annex. Farm animals will destroy the new undergrowth which should be coming on to take the place of the mature trees soon to be harvested. Consequently it is not wise to use the wood lot as a pasture annex.

Next set aside thirty acres for pasture and permanent hay lands. The wood lot and pasture area too need not be on the good smooth lands, otherwise suited to farming. On the other hand rougher and more broken areas not easily cultivated should be devoted to these purposes. They should be put in good condition to do the work for which they are intended. The pasture should be kept free from bushes and briars, ditches should be opened through wet spots, gullied spots should be plowed, fertilized and harrowed until in condition to support an abundant growth of grass. A posture has been defined as "a field in which grass does not grow." That deffinition does not apply to the modern pasture which must produce an abundant growth of nutritious grasses and grazing plants. The pasture which does not do this is not a good pasture. Something needs changing. The good farmer will seek out the cause of the short-coming and apply the remedy. The mowing of permanent grass hay fields require a fertile soil reasonably free from rocks, stumps and other obstructions which would interfere with the working of modern hay making machinery.

In the yard, lots, garden, orchard, roads and waste lands will be from fifteen to twenty acres or probably about 17.4 acres. In addition to yard lots, garden, orchard, etc., this seventeen acres should give patches for special soiling, forage, and grazing crops which will be needed for hogs and to supplement pastures and a supply of cured fodders for farm animals in general. The lots will be devoted largely to special crops, they are to be in eashy touch of the barn and stock pens, they will, therefore, receive liberal applications of rich manures; thus they should become very productive and profitable.

Seventy two and four-tenths acres have thus been disposed of, leaving seventy-five to be portioned out among the main farm crops.

Cotton is the money crop on practically all Southern farms. It will therefore be given first place in the plans. Corn which is to be the heavy grain crop for some time at least, receives second consideration, while the small grains will come next for their attention. A legume will have place between the hills in corn rows or between the rows. In middle and north Georgia peas provide the best crop for this purpose while further south peanuts and in some cases velvet beans may be profitable.

The small grains harvested in May or June should be followed by peas, or other legumes, with perhaps a sprinkling of sorghum seed, thus providing forage for domestic animals and giving a good store of stubble and roots to add to the humus and notrogen of the soil. Legumes following corn increases soil fertility in the same way.

This arrangement and order in rotation of crops calls for the division of the cultivated lands into three sections, which we will number 1, 2 and 3.

For the year 1908, division No. 1 is planted to cotton, No. 2 is planted to corn early in the spring and legumes at the time the corn receives its last cultivation, No. 3 is in small grain planted either in the preceeding fall or early in the spring. This small grain is to be harvested in the usual manner, after which the ground should be plowed and planted in the summer growing forage crops. This in turn will be harvested and cured for feed or marketing. The first year with this system is thus spent.

For the second year or 1909, as it will be in our work. Cotton goes on section No. 3, or where the legume forage grew in 1908. This section having had no crops growing on it since the fall harvest has been prepared by good thorough plowing in winter and early spring. Judicious use of the harrow will put this field in excellent condition to receive the cotton seed. Corn will go on section No. 1. This section has been free from crops since the last of cotton was gathered. There has been time to give it good plowing and harrowing before corn planting. Section No. 2 should have been planted to small grain in the fall of 1908. Legumes come after the corn and small grain crops of 1909.

In 1910 cotton goes on No. 2, corn on No. 3, small grain on No. 1, of course legumes follow corn and small grain each year. Cotton follows a crop of legumes, corn succeeds cotton. Counting the peas after corn as a separate crop the farmer gets five crops from each section within a period of three years. Of these five crops one is cotton, one corn, one small grain and two are legumes. Unless the soil was exceptionally well stocked with humus and nitrogen at the outset the place becomes more productive as year follows year and rotation comes after rotation.

The year 1911 duplicates 1908 so far as crop distribution is concerned while 1912 duplicates 1909; and 1913 does the same for 1910, and so on without limit.

Not quite eight out of every twelve farms in Georgia are owned and operated by white men. These farms contain upwards of 20,900,000 acres. Let us take it for granted that these farms produce three fourths of the cotton grown in the state or about one million two hundred thousand bales. It requires two and one half acres to make a bale of cotton. This means that our white farmers have planted an average of three million acres in the fleecy crop. Three million acres is only a shade more than one seventh of the land they own and operate. According to the rotation system outlined one sixth of the average farm could be put in cotton and yet leave an abundance of room for other crops This rotation though, if carried out for a period of six years will double the productiveness of the average farm. I have seen it tried and therefore I know whereof I speak. Then to make our average cotton crop we will be under the necessity of cultivating fewer acres, thus giving us more land for other purposes. If the consuming public will take more cotton at a good price, a price that will leave a good round profit to the producer, we can and will make it even though the demand be for several times our present output.

Cotton is not the only crop this Dixie land can grow to advantage. We can make hay in competition with any section of the United States. The corn belt does not boast of yields in excess of those made by some of our wide-awake Southern farmers. We have wheat and oat growers who make yields which would do credit to the soils of Iowa and Minnesota.

Let us during the next ten or fifteen years turn loose within the borders of Georgia from five to ten thousand young men trained in agriculture, in the principles of soil management and crop production, in the care and management of farm animals and along other lines of husbandry. Let these young men be backed up with a faith in their chosen field of work, a faith which recognizes no opposition. Let them be stimulated with a love for their state and an ambition to develop her. When this is done Georgia will take her position among agricultural and manufacturing commonwealths of the world. This position will be such as make the patriotic heart throb with pleasure and pride.

Let each young farmer help this day along by doing just a little better farming each year.

Improve soils, improve crops, improve animals, improve homes, improve states.

J. M. JOHNSON.

Farm Animals

WALTER M. OATES.

As a rule the average farmer pays as little attention to his farm animals as he possibly can. If one will look at this in the right way he will undoubtedly conclude that the farm is dependent on its animals. For without a good horse no plow or wagon can be drawn successfully, the essential to farm practice, consequently everything is a slow drag. Alas, from the spectator's view the farmer driving, or otherwise using, an attractive team is regarded as a successful farmer, while the opposite is regarded as a sure sign of a failure. Therefore if one wishes to make a good appearance, as he should, he should pay strict attention to his animals. Furthermore, as agriculture is held as the greatest industry in the world, and we know that it is dependent upon its animals, why not treat the animal and regard him in proportion to the position that he fills.

The essentials in regard to success with domestic animals are food and protection. The animal to make most from the food received should and must be fed at regular intervals. Regularity counts for a great deal in any line of farm operation, and to the farmer who would have good looking teams and cattle regularity in time of feeding and watering becomes the very essence of success. If your teams must be in the field by six-thirty in the morning, feed them at five-thirty and don't vary this period from day to day. The horse learns when to expect his breakfast and he gets ready for it at that time. If he is humored in this respect he will repay this consideration by giving a better forenoon's work. He will last longer, look better and step out when given the command with greater elasticity and willingness. It pays to consider the animal. His noon meal should come at a fixed or set time; not a quarter of an hour earlier or a half hour later, but at the time you and the horse have agreed upon. The same is true of the night's meal, which from the very necessity of the case should be the most liberal of the day. During the summer time or when we require a good long day's work from the horse, he should be given time to do most of his eating during daylight. He likes to do his rapid eating while it is yet day. When this is done he likes to have hay or forage to munch at as his fancy dictates during the night and early morning.

The horse will plow more acres or travel more miles upon the road if he is allowed a drink of water about the middle of the forenoon and again when the afternoon is half spent. Of course these drinks are in addition to the water allowed at the regular meal times. A small measure of meal or bran added to the water given at the middle of the work period will do much toward strengthening the horse for labor yet to come.

Not only should there be regularity in the time of feeding, but there should be just as great care exercised in seeing that quantity and quality are uniform from day to day, and week after week. It will not do to feed liberally today, sparingly tomorrow, liberally next day, or next week. Give enough each day to meet the demands made upon the animal mechanism for energy to do the average day's work and keep the machine in good order. Less than this causes unnecessary wear and tear which can only be made good at a considerable expense as to food and time in days to come. A superabundance at one day may result in indigestion and founder which often results very disasterously to farm and city teams alike.

There are very few farms in the South which cannot produce all necessary foods for work teams and other live stock. Our forage hay and grain bearing plants are so numerous and of such variety in composition that all requirements of the animal body can be met right at home and practically at any time they may be made. We can grow out own corn and oats for much less than we will have to pay for them in the markets and at the same time we may have the satisfaction of knowing that what we feed is not adulterated and does not contain seed of weeds to infest our soils and increase the cost of cultivating and making our crops. It is the part of the good farmer not to purchase any foods that he can produce at a lower cost on his farm at home. Why give the Western man twenty dollars for making and sending us a ton of timothy hay when right at home we may plant a mixture of oat and vetch seed in the fall, after cotton is done growing, and at a cost of from seven to ten dollars, harvest and put in the barn from one and a half to two tons of better hay than the Western man can make for us at from two to four times that cost. And this crop of pea vines and sorghum, yielding equally as well as the oat and vetch crop may be made at a comparatively light cost.

Corn is the most expensive of our food crops and one with which we can, and should, dispense with almost entirely. Farm raised foods for farm stock should be our motto.

The cheapest growth is made by grazing, especially when we have good grazing plants. Bermuda is the king of the Southern pasture and should be encouraged to extend his domain until there will be no farm in the South which does not have at least one good sized field subject to this king. As the cheapest growth is made by grazing, so is grazing the cheapest and most satisfactory method of maintaining stock not at the hardest of farm or road work. It is also the very best means by which a worn animal may be restored to much of his youthfull vigor. The care of animals on the farm demands a good bermuda or other great pasture on the farm.

Use good common sense in feeding,increase pastures and forage supplies to keep pace with all probable increase in the number of animals to be kept and so far as the feeding of ordinary farm stock is concerned the farmer cannot go far astray.

A wise farmer regardeth the life of his beast just as fully and truly as doth any other righteous man. Economy compells a farmer to be mindful of the way in which his beast is treated. Don't allow him to be abused or maltreated, imposed upon, overdriven, under-fed and whipped by thoughtless and careless farm hands. A farm horse or mule should do a reasonable amount of work. He should not be over driven or forced to go at a rapid pace up or down steep or rough roads at any time, and especially while moving heavy loads, or after a full day's work at draft or ordinary farm labor.

Stables and barns need not be expensive. In the North one of the chief objects in providing shelter for domestic animals is to protect them against cold, or rather to secure sufficient warmth. This often necessitates expensive barns and stables, which in the South are entirely unnecessary. In this fair land so wonderfully favored by nature some other points need and demand greater consideration.

The animal on the southern farm wants a good roof to protect him from rain and falling mists, which in some cases and at certain seasons become almost as heavy and even more penetrating than rains. He wants a good elevated footing upon which to stand, thus guaranteeing feet and a dry bed upon which he may recline. He wants a good wall to protect him from the damp and chilling winds which frequently spring up in late fall and early spring. Usually the walls to the north, east and west should be closed up tight for this purpose, while such conditions are not essential in the wall to the south. An abundance of light is also very desirable as is good ventilation without exposure to strong drafts. A barn or stable meeting all these essentials is not difficult or expensive of construction. In fact the average farmer who is fairly handy with tools can build such a structure with ordinary farm hands.

Our Southern markets generally recognize two distinct and essentially different types of horses. Differing as they do in form and function, each type fills a position peculiarly its own. The draft horse has the heavy loads to move. In doing this work he travels at a comparatively slow, steady gait, is not easily disturbed or upset. He usually has a good, quiet and unexcitable disposition. In form he is low and broad, of deep, massive body, on short stout, well developed legs and feet. Weight is a prime essential in the draft horse, especially is weight an important considration with the Northern and Western buyer and user. In the South we do not want quite so much weight, but we want a quicker, more springy action. Draft horses naturally divide themselves in turn into light and heavy drafters. Animals falling below sixteen hundred pounds in weight go in the class of light drafters. While those exceeding this weight are placed in the heavy class.

The light horse in respect to form and other characteristics may be divided into three main classes: The carriage horse, the road horse, and the saddle horse. The distinguishing features of the coach horse are its symmetry and action. The height should be about 16 hands to make a good appearance. In the carriage type the head should be comparatively small and lean, the ear neat, the neck long and carried gracefully. The body round, plump and the limbs clear cut, with well formed and durable feet. Graceful carriage and stylish action are leading qualifications. The leading qualifications of the roadster are speed and stammina. In addition to being able to stand steady road work, such a horse must be well mannered, so as to be safe and pleasant to drive. The typical roadster may be said to be about 15 1-2 hands high and about 1,000 pounds in weight. In conformation the horse of this class is somewhat narrow in front, deep chested, wide at the loins and very muscular in the quarters. Every feature about the horse appears clean cut, giving a hard finish which indicates durability. To describe the roadster form in detail it may be said: The head is proportioned to the rest of the body, wide between the eys and somewhat sharp at the pole. The neck is slim, long, and very often carried somewhat straight. The shoulders slope very makedly and extend well on toward the back. The back is short and strong, rising some at the hips, and the croup is strongly muscled.

The type of the saddle horse shows more quality and better manners than any other class of light horses. Aside from these features the most necessary qualifications of the saddle horse are the ability to show the different gaits that are required of horses of this class. The standard gaints are: (1) walk, (2) trot, (3) single foot, (4) canter, (5) slow pace. The advantage of the horse having as many gaits as possible is that exchange from one to another rests the rider, consequently one is enabled to ride for a longer length of time. The quarters of a saddle horse are clearly cut features, glove-like skin, silky hair and firm, clear bone. A freedom from coarseness in the joints and tendons show a soundness in these features that guarantees durability. Good action in the light horses is mainly desired for its utility and also for the many other qualities which it indicates. It will readily be expected that the horse with good action is more durable and more enjoyable, as the work is done easier, and also more profitable, for more of it is accomplished.

Another feature of both draft and light type to take into consideration is the temperament of the horse. The horse must have a good disposition; for a horse with a bad disposition is very unpleasant to manage. The horse should also be energetic and active.

While I have been using the word horse, I do not mean to leave the impression that the horse is better suited for farm work. The mule is superior to the horse in many respects for farm work. The mule can do more work, live on less, and last a longer time than the horse. Though the mule is equally susceptible to the various diseases as the horse, it can go longer without food and can live on coarser and more unpalatable food than the horse.

The cattle hold a very important position on the farm also. There are generally only two classes of cattle recognized, the beef and the dairy cow. The two main features in handling these two classes are: First, to select a good breed to begin with, and second to exercise the best judgment in feeding them.

Th form of the beef steers is, comparatively wide, round and deep ribbed. The steer that stands high from the ground, light in the flanks and shallow in the heart quite rarely makes a good feeder. In type the form should fill out a parallelagram, the lines being true in every direction. It should be broad and deep in front and this should be characteristic of the hindmost parts as well. Stoutness of form with depth of body are usually the characteristics of vigorous feeders.

The possession of quality, while it does not have much influence on the feeding ability of the steer, it has a marked effect on the value of the steer after being fattened. Quality in the steer means fine bone, soft, mellow hide and silky hair; while such attributes as a very rough, heavy frame, coarse joints, prominent, ragged hips and rough, open shoulders are the most pronounced evidences of deficiency in this feature. The feeding of the animal is one of the most important things connected with maturing good beef. In order to obtain a beef animal of the right form and quality it is necessary to begin with the young calf. The young calf should be given very close attention, and it is desirable to give them a liberal milk ration until they reach the age of five months. The milk feeding may then be stopped, and the grain and forage ration increased. From the age of two to three weeks the calves may be taught to eat ground grain. After this stage of development is reached, and the animal has had a well balanced ration containing a suitable amount of nitrogenous material, it has gained sufficient strength of bone and digestive power to enable them to be forced rapidly by the use of cheaper, and more carbonaceous foods.

The best kinds of grain that can be used for the production of beef is corn and cotton seed meal. The best kinds of forage are alfalfa, cow pea hay, and Johnson grass. These should be fed at regular times, usually only twice a day. The time of feeding should never vary.

As we all know the function of the dairy cow is to give milk, and to start at this in the right way it is necessary to select cows with reference to their milk yielding qualities. There are two breeds of cows that are unexcelled, the Holstein and the Jersey.

The Holstein cow is the largest of the dairy breeds in the United States. One of the chief virtues of the Holstein is its enormous milk production. The color is black and white, the relative proportion of the different colors varying greatly.

The Jerseys are perhaps better known than any other breed of dairy animal in the country. For the individual who can keep only a cow or two the Jersey is unquestionably the breed, being docile, and easily managed and enduring confinement as well as any other breed of cow. They are also equally valuable in large herds and yield milk of high fat content. One of their chief defects is their small size and tendency to delicacy. The color of the Jersey varies greatly from fawn and white to gray, cream color. Jerseys are much smaller and of finer structure than the Holsteins.

The feeding of the milch cow is very important, and depends largely on the kind of feed stuffs that are convenient to the farmer. The dairy cow is capable of utilizing a large amount of feed and turning it into milk. While the milch cow is noted for its ability to eat an enormous quantity, experiments have shown that she needs a comparatively narrow ration, that is, one containing a large amount of nitrogenous material. There are two ways of obtaining this protein, either through purchasing nitrogenous feeding stuffs, such as bran, cotton seed meal, oats, peas, etc., or by the use of leguminous forage plants, such as alfalfa, clover, cow peas, vetches and field peas. Cows should also receive grain, no matter what the rest of the ration should be. With regard to the size of the grain ration for cows it is, of course, necessary to graduate this according to the appetite and capability of each cow to utilize grain profitably.

Dairy cows require at least two and sometimes three kinds of food, viz.: grain, succulent material and coarse forage. The grain includes nearly all of those raised on the farm. Succulence is obtained in the form of solage, soiling crops, pasture and roots, while dry roughage is obtained from leguminous and cereal hays, corn fodder, etc.

* * *

Statement of Business Manager

We ask that you look over the advertisements in this publication and patronize them as much as possible. They are gentlemen who will treat you well, if you need anything in their line be sure to give them preference. If this publication has been the cause of the reader receiving any benefit or plasure he is indebted to the advertisers more than any one else for they made it possible to get out the publication by paying for the printing. I would be glad that all the readers would feel this obligation, but it is more binding upon the members of the Agricultural Club. Not only is this an obligation upon us but it is good policy for as many of us as return next fall to show our advertisers that we appreciate their help, by making the present advertising pay. Then it will be an easy matter to get advertisers in the next issue a year from now.

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Try the University Shoe

E. I. SMITH SHOE CO.

258 Clayton St.
Athens - Georgia

JOHN R. WHITE, President — JAMES WHITE, Cashier

Condensed Report of

THE NATIONAL BANK OF ATHENS
AT ATHENS, GEORGIA

At the Close of Business May 20, 1907.

RESOURCES		LIABILITIES	
Loans and Discounts	$707,262.41	Capital Stock	$100,000.00
U. S. Bonds	100.000.00	Surplus Fund	100,000.00
Real Estate, Stocks & Bonds	15,650.00	Undivided Profits	318,432.28
Due from Banks & Bankers	342,030.71	Nat'l Bk. Notes Outstand'g	100,000.00
Cash and Cash Items	162,061.64	Deposits	708,572.48
	$1,327,004.76		$1,327,004.76

INSURE

Your Horses and Mules

Against Death from any Cause
in the Oldest, Safest and
Cheapest Company
in the South

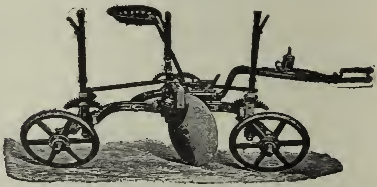
THE MUTUAL LIVE STOCK
INSURANCE COMPANY
OF GEORGIA

$15,000.00 Paid to Satisfied Policy Holders in 1906, $15,000.00

WILSON T. DREGER, Pres't and Gen. Mgr.
BOX 207
ATHENS, GA.

REVERSIBLE SLEDGE!

Pretty bad name, don't you think? We've talked *Reversible Disc Plows* so much, our friends think we deserve it. If you haven't seen the little "baby" *Reversible Disc Plow* made by the Chattanooga Plow Co., your agricultural education is not complete. No implement ever made has met with a more vigorous demand. Last year we simply could not get enough to go around. The factory could not make enough. If there is anything in "signs" somebody is going to be SORRY again this year. The present demand is greater than the factory's ability to make them. So here is fair warning to you Mr. College Boy, if you propose to take care of that little golden haired, blue eyed creature you left at home you had better "get busy" and prepare yourself for the "scrap" with one of these plows. Come in anyway and take a look, the result may mean money for us both.



Chattanooga Reversible Disc Plow

E. D. SLEDGE, Athens, Ga.
MAIL ORDERS WILL BE GIVEN PROMPT ATTENTION.

FOR---

Hardware, Paints, Oils, Implements, Builders' Supplies of Every Description, Roofing, Etc.

SEE--

Bondurant Hardware Company

Athens, Georgia.

ORGANIZED 1859

48th Annual Statement

January 1st, 1907

THE GEORGIA HOME INSURANCE CO.

OF COLUMBUS, GEORGIA.

Cash Capital	$300,000.00
Assets	1,117,509.16
Net Surplus	282,458.04
SURPLUS TO POLICY HOLDERS	**582,458.04**

OFFICERS

RHODES BROWNE, President.
DANA BLACKMAR, Vice-President
Wm. C. COART, Secretary.
J. O. McNULTY, Treasurer.

ASSETS

Cash in Banks and Office	$100,190.83
Cash in Hands of Agents and others	110,105.15
United States Registered Bonds	40,500.00
State, Municipal and Industrial Bonds	124,880.00
National and other Bank Stocks	101,635.00
Cotton Manufacturing Stocks	260,500.00
Other Local Stocks	43,125.60
Real Estate, (unencumbered)	127,000.00
Loans secured by First Mortgages, etc	209,572.58
Total Assets	$1,117,509.16

LIABILITIES

Capital Stock	$300,000.00
Re-Insurance Reserve	446,937.28
Unadjusted Losses	36,177.63
All other Liabilities	51,936.21
Total Liabilities	$835,051.12
Net Surplus	282,458.04
	$1,117,509.16

LOSSES PAID TO DATE.....Over $5,000,000.00

Athens Electric Railway Co.

Steam Turbine and Water Turbine Installations, Generating Electricity for Railway, Lights, Motors and City Lights.

ATHENS, GEORGIA

So Easy To Fix

Other Pumps So Hard to Fix

"So Easy To Fix" Pumps. No Glass. For Wells any depth. Hand and Power.

Dunn Machinery Company,
Dep't 32
ATLANTA, GEORGIA

LOWRANCE & HUDSON

DENTISTS

220 1-2 Clayton St. Athens, Ga.

Fertilizers
Virginia-Carolina
Chemical
Co.

Chas. Stern Co.

ATHENS, GA.

Outfitters to Men and Boys

Clothing, Hats, Furnishing Goods
and Shoes

That satisfies or your money back

BAILEY SUPPLY CO.

Dealers in

**Stoves, Ranges, Tinware, Cabinet
Mantels, Grates and Tiles**

Mill Supplies, Belting, Hardware and Tinplate

Telephone 111 225 Clayton Street

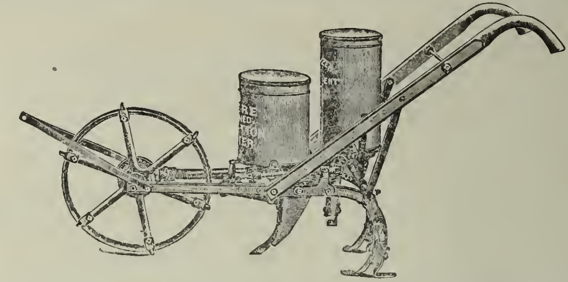
ATHENS, GEORGIA

The Banner Job Office

Up-to-Date Job Printing

We Printed the Agricultural Annual

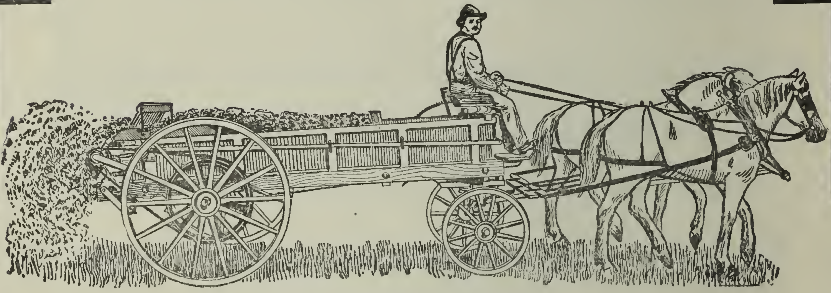
149-151 Lnmpkin St. Athens, Ga.



No. 16½ Cotton and Corn Planter with Fertilizer Attachment

JOHN DEERE TOOLS

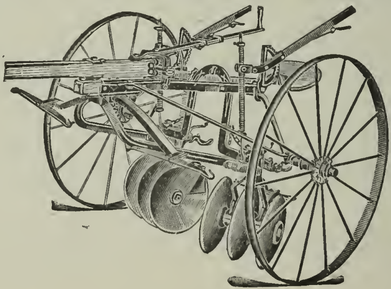
Have Led the Way for 70 Years.



Success Manure Spreader.

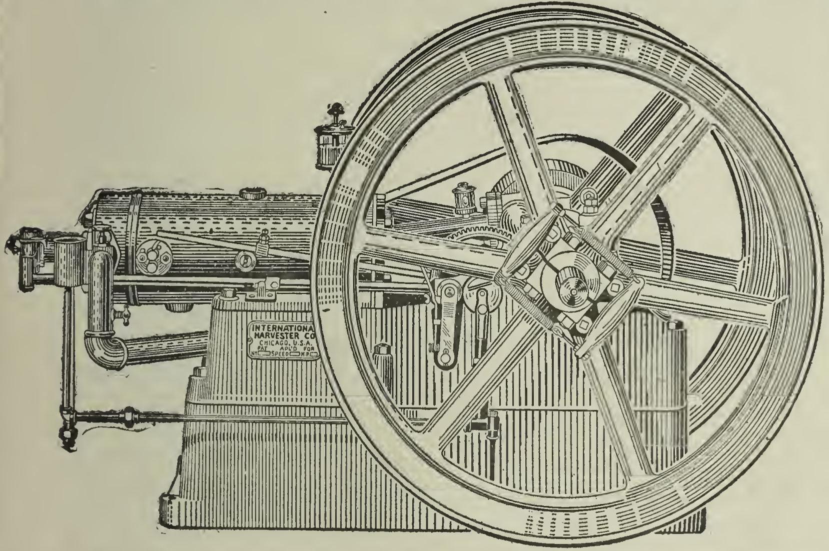
JOHN DEERE PLOW CO.

St. Louis and New Orleans.



Deere Disk Cultivator.

The Greatest Help on the Farm



Every day brings its labors. The question in the mind of the progressive, up-to-date farmer is how this work can be accomplished with the least labor and greatest economy.

The catalogue issued by the International Harvester Company of America describing its gas and gasoline engines is not only strikingly artistic but contains very valuable information. It will tell you much that you should know. How you can saw wood, pump water, shell corn, gridd feed, thresh and perform many other operations, with a great saving. Furthermore the construction and operation of I. H. C. engines is fully described and illustrated. Gasoline power is becoming more popular and necessary on the farm every year. You should know about it. Thousands of the I. H. C. engines are rendering valuable help to the farmers of this country.

Sizes: Vertical 2 and 3-HP. Horizontal 4, 6, 8, 10, 12, 15 and 20-HP.

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